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National Household Pesticide Usage Study 1976-1977

Colorado State Univ.
Fort Collins

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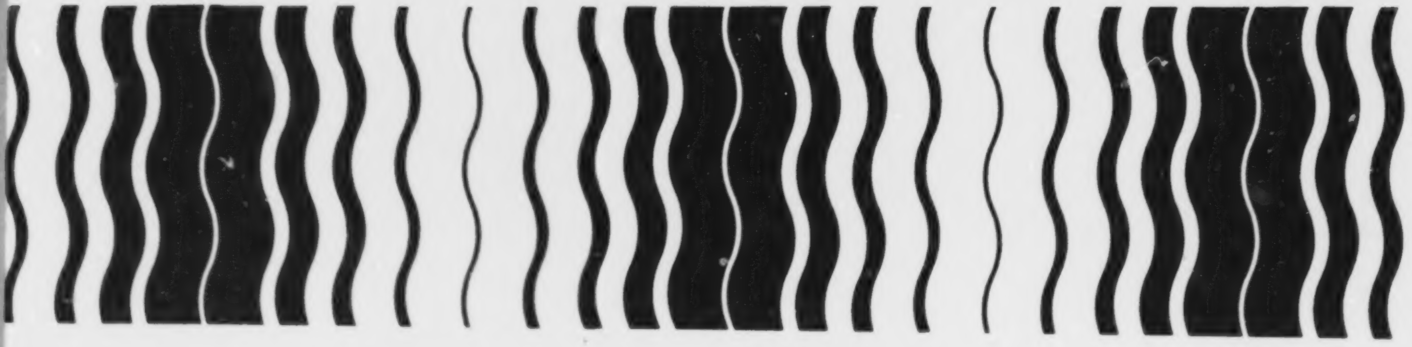

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Pesticides are widely used throughout the United States in the home environment and such usage may result in several environmental and human problems. Since household members may fail to read and fully understand the label instructions, misuse and overuse of the often potentially toxic compounds may precede contamination of small sectors of the surrounding ecosystem and accidental poisoning of man and animals (1). In the United States, only limited information has been available regarding the quantities of pesticides applied by householders relative to other sources of use. To date, the most extensive survey of pesticide usage was completed in 1974 and focused on only 25 selected compounds. This report presents the results of a national household pesticide usage study.

KEYWORDS: *Pesticides, *Households, *Toxic substances.

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NATIONAL HOUSEHOLD PESTICIDE
USAGE STUDY, 1976-1977

Final Report

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BACKGROUND

Pesticides are widely used throughout the United States in the home environment and such usage may result in several environmental and human problems. Since household members may fail to read and fully understand the label instructions, misuse and overuse of the often potentially toxic compounds may precede contamination of small sectors of the surrounding ecosystem and accidental poisoning of man and animals (1).

In the United States, only limited information has been available regarding the quantities of pesticides applied by householders relative to other sources of use. To date, the most extensive survey of pesticide usage was completed in 1974 and focused on only 25 selected compounds as listed in Table 1 (2). United States consumption of the 25 selected compounds was 1.54 billion pounds of active ingredient (AI) in 1972. The use of creosote, a compound applied extensively as a wood preservative and fungicide, accounted for 64% of that total amount. Because creosote was used almost exclusively by the industrial/commercial/institutional sector, the relative amounts consumed are not of importance in the present discussion.

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Excluding creosote, the total consumption of the remaining 24 compounds was 0.57 billion pounds AI. Of the 0.57 billion pounds AI, 23% was used by the industrial/commercial/institutional sector, 2% by governmental sector, 12% by the home and garden sector, and 63% by the agricultural sector (Table 2). Home and garden use consumed 8.1% of the 10 insecticides studied, 2.4% of the eight herbicides, 12.5% of the three fungicides and 50% of the two fumigants. Twelve of the twenty-four compounds were used in measurable amounts in the house and garden and are listed in Table 3. According to this survey, 71% of all paradichlorobenzene consumed in 1972 was used by the

Table 1. The twenty-five intensive-study pesticides*.

Insecticides

Aldrin
Carbaryl
Carbofuran
Chlordane [a]
Diazinon
Disulfoton
Malathion
Methyl Parathion
Parathion
Toxaphene

Fungicides and Wood Preservatives

Captan
Creosote
Maneb
Pentachlorophenol [c]

Special Category

Organotin Compounds

Herbicides

Alachlor
Atrazine
Bromacil
2,4-D
Diuron
MSMA
Sodium Chlorate [b]
Trifluralin

Fumigants

p-Dichlorobenzene [d]
Methyl Bromide [e]

---

[a] Includes use as termite treatment of wood structures

[b] Includes mixtures with borates

[c] Includes herbicidal use

[d] Includes lavatory-space deodorant uses

[e] Includes soil sterilization for weeds and insects and structural termite treatment

*Abstracted from VonRumker, R., Production, distribution, use and environmental impact potential of selected pesticides. Office of Pesticide Programs, Office of Water and Hazardous Materials, Environmental Protection Agency, March 1974.

Table 2. U.S. consumption* of twenty-four selected pesticides by use sector**.

Pesticide Type	U.S. Total	% Industrial	% Governmental	% Home & Garden	% Agricultural
Insecticides	193.6	8%	2.6%	8.1%	81.3%
Herbicides	224.7	16.4%	2.7%	2.4%	78.4%
Fungicides & Wood Preservatives (excl. Creosote)	72.6	65.4%	--	12.5%	22.0%
Fumigants	78.0	35.9%	2.6%	50%	11.5%
Tin Compounds	1.45	55.2%	--	--	44.8%
Total	570.35	23%	2%	12%	63%

*Million pounds active ingredient

**vonRumker, R., Production, distribution, use and environmental impact potential of selected pesticides. Office of Pesticide Programs, Office of Water and Hazardous Materials, Environmental Protection Agency, March 1974.

Table 3. Pounds of active ingredient consumed in U.S. and percent household usage for twelve selected pesticides.*

Pesticide	Use	Lbs. AI Consumed in U.S. X 10^6	% Household use
p-Dichlorobenzene	Moth fumigant & lavatory deodorant	55.0	71%
Captan	Fungicide	16.0	37.5%
Chlordane	Broad spectrum insecticide	15.0	33.3%
Malathion	Broad spectrum insecticide	16.2	30.8%
Diazinon	Broad spectrum insecticide	7.0	28.5%
Maneb	Fungicide	7.6	27.0%
Carbaryl	Broad spectrum insecticide	25.0	14%
MSMA	Herbicide	19.0	7.9%
2,4-D	Herbicide	48.0	6.2%
Pentachlorophenol	Fungicide & Herbicide	49.0	3%
Disulfoton	Broad spectrum insecticide	5.0	2.0%
Atrazine	Herbicide	75.0	1.3%

*vonRumker, R., Production, distribution, use and environmental impact potential of selected pesticides. Office of Pesticide Programs, Office of Water and Hazardous Materials, Environmental Protection Agency, March 1974.

American householders. Usage estimates and percent of household use for the other 11 compounds are found in Table 3.

The data presented previously were usage estimates of only 24 selected compounds. Usage information for all pesticides by sector of use is necessary. To partially answer this need, pesticide usage data for the industrial, governmental, and agricultural sectors of the United States were compiled for each state in 1974. Results of this study indicated that 903.2 million pounds of pesticides were used in the United States in 1974 (3). Over 94% of all pesticides were used by agriculture, 3.5% by government, and 2.5% by industry (Table 4). The amounts of pesticides reported used varied by geographic region. Approximately 26% of the pesticides were used in EPA Region IV, 18% in EPA Region VI, and 16% in EPA Region V.

A review of the literature has revealed that pesticide usage data for the home and garden in the United States was very limited. Several small scale studies have been conducted in which household usage of pesticides has been estimated. For example, a study of three urban areas, Philadephia, Pennsylvania; Dallas, Texas; and Lansing, Michigan was completed in 1972 (4). The study area population of 5.5 million people was comprised of 1,244,000 single family dwelling units. Of a total of 525 respondents in the study, 92.5% reported using pesticides. It is of considerable interest that 84% of these interviewed used pesticides without reservations. Only 8.5% of the respondents indicated that they were concerned with possible side effects from pesticide use.

From the results of the three city study, the authors estimated the average deposit of active pesticide ingredients to be between 5.3 and 10.6 lbs. per acre. Although distinctly different home and garden usage patterns were seen in each area, there was no observed correlation between the number of single family residences and estimated quantities of pesticides used. As

Table 4. Estimated pesticide usage* for U.S. and EPA regions by type of use.***

EPA REGION	AGRICULTURE	GOVERNMENT	INDUSTRY**	TOTAL	% OF TOTAL
I	6.1	.7	1.1	7.9	1%
II	12.7	1.8	1.6	16.1	2%
III	19.5	1.4	2.8	23.7	3%
IV	213.8	14.1	9.4	237.3	26%
V	140.1	2.1	2.1	144.3	16%
VI	159.1	5.8	1.7	166.6	18%
VII	127.5	.8	1.2	129.5	14%
VIII	37.9	.9	.7	39.5	4%
IX	104.5	2.5	2.2	109.2	12%
X	26.0	2.7	.4	29.1	3%
U.S. Total	847.2	32.8	23.2	903.2	
% of Total	94%	3.5%	2.5%		

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* In million pounds active ingredient

**Totals reported

***Keil, J.E., et al., Pesticide usage survey of agricultural, governmental, and industrial sectors in the United States. Abridged report, June 1977.

postulated by the authors, these differences were probably due to varying climatic, soil, environmental and man-made conditions.

A second limited study conducted in South Carolina in 1969 reported that 89% of 196 families surveyed used pesticides and that 33% of the users applied these chemicals during each week of the year (5). Results of this study indicated that safety practices for handling pesticides were inadequate. For example, approximately 88% of the responding families stored their pesticides in unlocked areas; 66% stored their pesticides within easy reach of small children; and 54% stored their pesticides near food or medicine. Two-thirds of all pesticide users interviewed neither wore gloves during application nor washed their hands following application.

In 1974, 230 families in 18 Colorado communities were interviewed to determine their pesticide usage practices (6). The results of this household usage study were as follows: 71.7% of the families used pesticides; 29% stored their pesticides in locked storage areas; and 25% observed protective measures during application. A very disturbing result of this study was that 5.7% of the families did not store their pesticides in original containers with attached warning labels. In 1974, a survey of 28 area retailers in 11 Colorado communities revealed that malathion, diazinon, Sevin, and Isotox were the compounds most frequently sold for use on lawns and gardens by householders. An interesting observation in this study was that the most hazardous pesticides sold in retail stores were highly concentrated Zectran, toxaphene, and Delnav. All of these pesticides were sold in easily breakable bottles.

In summary, data that have been presented regarding household pesticide usage have been a result of several limited studies. This report presents the results of a national household pesticide usage study. This study was the first major effort in the United States to provide pesticide usage information on a national basis.

METHODS

Based on cost limitations and precision requirements, this study was designed to include a sample size of approximately 10,000 households with an anticipated refusal and not-at-home rate of approximately 20%.

Since approximately three-fourths of the United States population resides in metropolitan areas of populations greater than or equal to 50,000 which are classified as Standard Metropolitan Statistical Areas (SMSAs), 7,500 sampling units (households) of the proposed 10,000 were allocated to SMSA areas and the remaining 2,500 sampling units were allocated to non-SMSA counties in the United States.

SMSA Selection

According to data from the 1970 census, 243 SMSAs existed within the United States. This list of SMSAs constituted the sampling frame to which the following scheme was applied for the sample selection of 25 SMSAs. Initially, the United States was divided into the 10 Environmental Protection Agency regions. Three SMSAs of the 25 SMSA sample were allocated to each of the five EPA regions with the largest number of SMSAs (Region I, III, IV, V, and VI), and two SMSAs were allocated to each of the remaining five regions that have the smallest number of SMSAs (Regions II, VII, VIII, IX, and X). All SMSAs within the 10 EPA regions were ranked by number of occupied housing units. Depending on whether an EPA region was allocated three or two SMSAs, the rank list was divided into either three or two quantiles, respectively, Secondly, all SMSAs within the 10 regions were divided into either 3 (if a region was allocated 3 SMSAs) or 2 geographic areas so that each area contained either approximately one-third or one-half of the SMSAs in the region. In some instances this requirement necessitated that a state be divided into two geographic areas. For example, in EPA Region IX, one geographic area consisted of Nevada and northern California and the other area of southern California and Arizona. Similarly, Massachusetts was divided into two different geographic areas within Region I. The final step of the sampling scheme consisted of a random selection of three or two SMSAs within each EPA region for a total of 25 SMSAs so that each quantile and geographic area was represented once. The sampling scheme described above is called a Latin square sample design as shown by examples in Tables 5 and 6 (7).

County Selection

A similar Latin square sampling scheme was applied for the selection of counties outside of the SMSA areas. From the sampling frame of all non-SMSA counties within the United States, 25 were randomly selected so that three non-SMSA counties were chosen from each of the following five EPA regions: Region IV, VII, VIII, IX, and X. Two non-SMSA counties were selected from each of the remaining regions (Regions I, II, III, V, and VI). When three SMSAs were chosen from an EPA region, generally only two non-SMSA counties were selected, and vice-versa. However, EPA Regions II and IV were exceptions to the above rule. Because Region II was composed of only two states, two SMSAs and two non-SMSA counties were sampled within that region. Within EPA Region IV three SMSAs and three non-SMSA counties were sampled due to the large number of counties in this region.

Following allocation of the number of non-SMSA counties to be sampled within each region, all non-SMSA counties within that region were ranked by population and divided into the appropriate (two or three) number of quantiles and geographic areas. As was done with the selection of SMSAs, the required

Table 5. The Latin Square sampling scheme for the random selection of three SMSAs in EPA Region VI. National Household Pesticide Usage Study, 1976-1977.

EPA Region VI	SMSA Size		
Geographic Subregion	Large	Medium	Small
Louisiana Arkansas Oklahoma	New Orleans, Louisiana Little Rock, Arkansas Tulsa, Oklahoma Oklahoma City, Oklahoma	Lake Charles, Louisiana Shreveport, Louisiana Baton Rouge, Louisiana Fort Smith, Arkansas*	Monroe, Louisiana LaFayette, Louisiana Pine Bluff, Arkansas Lawton, Oklahoma
North Texas New Mexico	Dallas, Texas Fort Worth, Texas Albuquerque, New Mexico*	Amarillo, Texas Lubbock, Texas Wichita Falls, Texas Waco, Texas	Sherman, Texas Abilene, Texas Tyler, Texas Texarkana, Texas
South Texas	El Paso, Texas San Antonio, Texas Houston, Texas Austin, Texas Beaumont, Texas	Galveston, Texas Corpus Christi, Texas McAllen, Texas Brownsville, Texas	Odessa, Texas Midland, Texas* San Angelo, Texas Laredo, Texas Bryan, Texas

*Sampled SMSAs

Table 6. The Latin Square sampling scheme for the random selection of two SMSAs in EPA Region VII. National Household Pesticide Usage Study, 1976-1977.

EPA Region VII	SMSA Size	
Geographic Subregion	Large	Small
Iowa Nebraska	Cedar Rapids, Iowa Des Moines, Iowa Omaha, Nebraska* Lincoln, Nebraska	Dubuque, Iowa Waterloo, Iowa Sioux City, Iowa
Kansas Missouri	Wichita, Kansas Kansas City, Missouri St. Louis, Missouri	Topeka, Kansas St. Joseph, Missouri Columbia, Missouri Springfield, Missouri*

*Sampled SMSAs

number of non-SMSA counties were randomly chosen under the restriction that each quantile and geographic area was represented once.

Household Selection Within Each Sampled SMSA

Each SMSA selected for the national study had been subdivided into census tracts and blocks within each census tract by the Bureau of the Census. These two subdivisions, census tracts and blocks, formed the basis for the actual selection of the households to be interviewed.

Although the original study plan called for a stratification of all census tracts in the SMSAs into three socioeconomic groups, the stratification was not done due to inadequate data in the Census Tracts PHC(1) series of the 1970 Census of Population and Housing. Therefore, from the list of all census tracts within each selected SMSA, a random sample of census tracts was obtained with the requirement that the selected census tracts include at least 10% of the occupied housing units in that SMSA. From these selected census tracts, the 7,500 interviews for the SMSAs were proportionately allocated based on a measure of the number of occupied housing units within the selected tracts.

To distribute the allotted number of interviews for each sampled census tract, the interviews were allocated to blocks within each census tract. Blocks were randomly selected per census tract according to the proportion of blocks per census tract. Thus, a census tract with a larger number of blocks had more blocks selected for interviewing than a census tract with a smaller number of blocks.

The number of interviews for each selected block was proportionately allocated on the basis of the number of households per block. The interviewer used a list of random numbers to select the households to be interviewed. This procedure guaranteed that each household on the block had an equal probability of being selected for interview.

Household Selection Within a Nonurbanized Portion of Each Sampled SMSA

Census tracts or partial census tracts included in the nonurbanized portions of the SMSAs consisted of these census tracts within each SMSA that were either entirely outside of the urbanized area or partially in and partially out of the urbanized area and census tracts or partial census tracts for which information was incomplete. Since only the number of occupied housing units for each nonurbanized tract was available, a different system was devised for sample selection so that the number in interviews for each nonurbanized tract was proportionately allocated based on the number of households within that tract.

To allocate the number of interviews per block, county maps were obtained from each State Highway Division of Planning and Research. With the exception of states in the original 13 colonies, Texas, and parts of Ohio, these maps displayed one-mile sections in townships. If the townships did not contain an incorporated or unincorporated town, the tract was further classified as nonurbanized rural and the one-mile sections were numbered. In these nonurbanized rural areas, sections with households adjacent to roads were randomly selected so as to the required sampling of households was proportional to the number of housing units in each section.

When the census tracts within the nonurbanized area contained a town (incorporated or nonincorporated), the census tract was classified as nonurbanized urban. In this case, the number of households to be interviewed was proportionally allocated between the town and the remaining areas. To facilitate the selection of households to be interviewed, maps were obtained and the blocks were numbered. Households were then selected for interview from randomly selected numbered blocks. The number of households interviewed averaged eight per block. The following example illustrates the sample selection procedure.

The town of Sallisaw Oklahoma, is within census tract 303 which is located outside of the urbanized area of the Fort Smith, Arkansas-Oklahoma SMSA. The total population of the tract is 5,488, of which 4,888 reside in Sallisaw and 600 reside in the tract outside of Sallisaw. It had been previously determined that 51 interviews should be obtained from this tract; therefore, through proportional allocation 89% or 45 interviews were obtained from households within the city of Sallisaw and 6 interviews were obtained from households in the area of the tract outside of Sallisaw. To complete these 45 interviews in Sallisaw six blocks were randomly selected from the total number of blocks. Eight households were randomly sampled for interview in five of the blocks and five interviews were completed in the remaining block.

Six interviews were needed in the remainder of the tract. All sections in the area of the tract were numbered and two sections were randomly selected. These households were sampled in each of these two randomly selected sections.

Alternate blocks or sections were selected if the original selected blocks or sections no longer existed or if they did not contain enough occupied households.

Household Selection Within Sampled Non-SMSA Counties

County maps with county census subdivisions were obtained from the Bureau of the Census. These subdivisions and the population contained therein served as the basis for the apportionment of the sample. Every subdivision for each non-SMSA county was placed into a population-based strata. Stratum I contained all census subdivisions with a population of 10,000 or above. The census subdivisions of populations between 10,000 and 2,500 were placed into

Stratum II. Subdivisions containing a population of less than 2,500 were categorized into Stratum III. One subdivision was randomly selected from each of the three strata. The number of interviews per selected subdivision was proportional to the population in the subdivision.

Household selection within each sampled county is illustrated in the following example for Yuba County, California.

> Yuba County, population 44,736, is divided into five county census subdivisions in the 1970 Number of Inhabitants booklet released by the Bureau of the Census. Based solely on population size, each of the five subdivisions was placed into one of three strata. Referring to the data contained in the Number of Inhabitants booklet, three of the subdivisions in Yuba County are in Stratum I, none in Stratum II, and two in Stratum III. A proportional allocation system based on the population in each of of the two strata (Stratum II did not contain any subdivisions) versus the population in Yuba County resulted in the allocation of 129 interviews to Stratum I and 12 interviews to Stratum III. The Marysville subdivision in Stratum I was selected as the site for the 129 interviews and the Wheatland subdivision as the location for the 12 interviews in Stratum III.

Within each selected subdivision, the sample was proportionally allocated to the incorporated or unincorporated towns in the subdivision and the remainder of the subdivision. For example, of the 129 sampled households in the Marysville subdivision, 96 were allocated to Marysville City and 33 to the remainder of the Marysville subdivision. (Marysville City's population is 9,353; remainder of the subdivision's population is 3,182.) All of the population figures are from the Number of Inhabitants booklet in the 1970 Bureau of the Census material.

To select households within the towns in each sampled subdivision, block statistics were used to obtain the block numbers in all towns with a population of greater than 2,500. In towns without published block statistics, a town map was obtained and the blocks were numbered. Sampling of households for interview was similar to that in the nonurbanized urban area of each SMSA. For example, since 96 households were to be interviewed in Marysville City, 12 blocks were randomly selected from the block statistics. Additionally, two adjacent alternate blocks were chosen in the same manner as previously described for each sampled block in the event that eight interviews could not be obtained from the original block.

The selection of households to be interviewed in the remainder of each subdivision (rural portion) was done in a manner similar to the selection in a nonurbanized rural portion of each SMSA. For example, 33 interviews were allotted to the remainder of the Marysville subdivision. The accessible area within the remainder of the subdivision was divided into sections and numbered. Eleven sections were randomly selected in the remainder of the Marysville subdivision, and three households were randomly selected in each section. An alternate section was also selected for each original selection in the event that three interviews could not be obtained from a selected section.

When the field interviewers arrived at a selected block within an incorporated or unincorporated town in a county, they counted and recorded the addresses of the houses. Using a table of random numbers, the interviewers selected eight houses per block to interview. In the rural areas, all households were counted and recorded in a section or area bounded by roads, and three households were randomly selected.

Following the selection of blocks or sections for sampling and the allotment of interviews, maps and route itineraries were made for every SMSA and county and included the following information:

1. assigned tract and block section code
2. interviewer team assignment
3. tract number
4. block section number
5. number of interviews
6. name of streets surrounding the block section
7. alternate block section numbers

Route itineraries giving the same information were made for the alternate blocks. Therefore, the field interviewer possessed both a map with selected blocks or sections identified and route itineraries with all of the necessary sampling data.

The following methods were designed to deal with refusals, alternate houses, and alternate blocks that the interviewer might encounter. A record of vacant houses was kept by the interviewer. An alternate home was chosen for each vacant house according to the sampling procedure described previously. The alternate column in header information was marked accordingly on the questionnaire form. Extended efforts were made to complete interviews even though the initial interview attempt had resulted in a refusal. These efforts included call backs by different interviewers at a different time of day or evening. As many as three call backs were made on refusals before entering a refusal into the refusal column. Some of the selected households had no one at home when the interviewer was on the block. A household in which no one 18 years or older was present was considered a "not-at-home". To minimize possible sources of bias, each "not-at-home" was recontacted on two or three occasions, often times after 5:00 P.M. In the event that occupied housing units on a selected block no longer existed or the number of houses was less than the required sample size, the interviewers were referred to route itineraries for alternate blocks prechosen for each tract. Additionally, if there were enough houses on the block to obtain the sample but all of the houses were contacted without getting the required number of interviews due to vacancy or refusal, it was necessary to go to the alternate block to finish the sample.

Questionnaire

The questionnaire (see Appendix A) was developed to cover the many aspects of household pesticide usage and storage. Additionally, several questions were included on possible household pesticide poisonings. The questionnaire contained person data such as the household head's age, occupation, race, education and household data such as type of residence.

The training manual (Appendix B) was compiled to obtain uniformity in conducting the field studies. The manual contained detailed explanations of each question in the questionnaire, and the procedure for recording interviewee responses. The training manual also included detailed procedures and recommendations for eliciting participation from the selected households. One part of the training manual presented techniques for observing and recording all of the pesticides stored on the premises.

Quality Control

To increase validity in the National Household Pesticide Usage Study, a detailed quality control system was employed. Quality control included training of field interviewer supervisors, field testing of the questionnaire, study design control, presample control, sample control, and postsample control. The quality control system was applied at all stages of the study to insure uniformity and accuracy of data collection.

A training session was held at Colorado State University before interviewing began. At this session, the first day was spent explaining the questionnaire and providing directions on how to ask each question and record each response. The remainder of the training session was spent completing practice interviews with actual households and reviewing the completed questionnaire with the interviewers.

A second training session was conducted by trained field epidemiologists from the Colorado Center at selected sampling sites. At this time, interviewers were trained in the use of route itineraries and maps. After several interviews were completed, each interviewer was further evaluated by the field epidemiologist and recommendations were made to assure uniform interviewing techniques. A daily log or daily interview summary form (Figure 1) was tabulated at the termination of each working day by a member of each of the interview teams. That individual was solely responsible for each day's tabulations and for the editing of completed questionnaires. This same individual was also responsible for mailing each week's questionnaires to the Colorado Center.

The questionnaires were coded and keypunched at the Colorado Center. The questions that required separate coding, such as the header information on page 1 and the household information on page 5, were coded by one individual at the Center to maintain as much uniformity as possible. Also at this stage, all pesticide products recorded on the questionnaires were numerically coded according to the Pindex (Pesticide Index) System, which was developed by the South Carolina Epidemiologic Pesticide Studies Center to classify and code pesticides by active ingredient. All questionnaires were reexamined by one person at the Center to assure proper coding and questionnaire consistency. Additionally, household interviews that suggested a human poisoning had occurred were recontacted to validate the responses on the interview form.

Figure 1. Log Book

SMSA or County ____________________

State ______________________________

Location	Household #	Block #	Status	Part. Inter.	Time	Interviewer	Storage Examined

Comments:

Data Analysis

National, as well as regional, estimates were made for the total number of households with characteristics related to pesticide usage and storage (for example, number of households using pesticides in the garden). Furthermore, the estimated total amounts of a specific pesticide that were used and/or stored, for specific compounds, were obtained from the data of the Household Pesticide Usage Study. Figure 2 presents the notation and formulae for the estimation procedure described above for both SMSA and non-SMSA areas.

RESULTS

The National Household Pesticide Usage Study was designed to include a sample size of approximately 10,000 households and an anticipated refusal and "not-at-home" rate of 20%. Within the selected sample, 8254 households granted an interview for an overall response rate of 82.8%; thus, the actual combined percent of refusals and "not-at-homes" for the entire United States was less than the anticipated 20%. Among the 10 EPA regions, the proportion of interviews obtained varied slightly in that the highest proportion was 91.0% in Region VIII and the lowest was 78.2% in Region IV (Table 7).

Household Pesticide Usage

Based on data obtained from the 8254 respondents in the National Household Pesticide Usage Study, it is estimated that 90.7% of all households in the United States used pesticides in their house, garden, or yard. In this study, a household was considered to use pesticides if a member of the household applied retail pesticide products (including no-pest strips and moth-balls), employed a commercial pesticide applicator, or used pet insecticides.

Figure 2. Notation and formulae used in the estimation procedure. National Household Pesticide Usage Study, 1976-1977.

Symbol	Definition	Formula or Data Source
N_{ijk}	Total number of households in k^{th} sampled SMSA or county in the j^{th} EPA region; where "i = 1" is used for SMSAs and "i = 2" is used for counties.	United States Census
n^*_{ijk}	Total number of sampled households (respondents only; i.e., excluding refusals and not-at-homes) in the k^{th} SMSA or county in the j^{th} EPA region.	National Household Pesticide Usage Study, 1976-1977
y_{ijk}	Total number of sampled households in the k^{th} SMSA or county in the j^{th} EPA region with the characteristic of interest (e.g., using pesticides or storing pesticides inadequately) or the total amount of a specific pesticide used during the past twelve months or currently stored.	National Household Pesticide Usage Study, 1976-1977
$\hat{Y}_{ijk}$	Estimated total number of households in the k^{th} SMSA or county in the j^{th} EPA region with the characteristic of interest or the estimated total amount of a specific pesticide used during the past twelve months or currently stored.	$\hat{Y}_{ijk} = \frac{y_{ijk}}{n^*_{ijk}} N_{ijk}$
S^2_{ijk}	Estimated variance of $\hat{Y}$ (Standard error of $\hat{Y}_{ijk}$ is S_{ijk}; standard error of following estimators is simply the square root of the sum of the corresponding variance estimators.)	$\frac{N_{ijk}}{n^*_{ijk}}\left(\frac{N_{ijk}-n^*_{ijk}}{n^*_{ijk}-1}\right)\sum_{\ell=1}^{n^*_{ijk}}\left(y_{ijk\ell}-\bar{y}_{ijk}\right)^2$

Figure 2. (Continued)

Symbol	Definition	Formula or Data Source
N_{ij}	Total number of households among all SMSAs or counties in the j^{th} EPA region.	United States Census
N'_{ij}	Total number of households in the sampled SMSAs or counties within the j^{th} EPA region.	United States Census
$\hat{Y}_{ij}$	Estimated total number of households among SMSAs or counties in the j^{th} EPA region with the characteristic of interest (see Y_{ijk} definition) or the estimated total amount of a specific pesticide used during the past twelve months or currently stored.	$\hat{Y}_{ij} = \left(\sum_{k=1}^{2(3)} \hat{Y}_{ijk} \right) \frac{N_{ij}}{N'_{ij}}$
N_j	Total number of households in the j^{th} EPA region.	$N_j = N_{ij} + N_{2j}$
N'_j	Total number of households in the sampled SMSAs and counties together with the j^{th} EPA region.	$N'_j = N'_{ij} + N'_{2j}$
N	Total number of households in the United States.	United States Census
$\hat{Y}_{\cdot j}$	Estimated total number of households in the j^{th} EPA region with the characteristic of interest or the estimated total amount of a specific pesticide used during the past twelve monts or currently stored.	$\hat{Y}_{\cdot j} = \hat{Y}_{1j} + \hat{Y}_{2j}$
$\hat{Y}$	Estimated total number of households in the United States with the characteristic of interest (e.g., using pesticides in the home) or the total amount of a specific pesticide used in the past twelve months or currently stored.	$\hat{Y} = \hat{Y}_{1\cdot} + \hat{Y}_{2\cdot} = \sum_{j=1}^{10} \hat{Y}_{\cdot j}$

Table 7. Number of households in the population; number of sampled households resulting in interviews, refusals, and not-at-homes by EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Population Number	Sample Number	Interviews		Refusals		Not-At-Homes	
			Number	Percent	Number	Percent	Number	Percent
I	412100	948	780	82.3	108	11.4	60	6.3
II	8826000	1109	961	86.7	86	7.7	62	5.6
III	8160000	1058	861	81.4	167	15.8	30	2.8
IV	11897000	1301	1017	78.2	183	14.1	101	7.7
V	15036000	1360	1099	80.8	139	10.2	122	9.0
VI	7515000	742	605	81.5	100	13.5	37	5.0
VII	4041000	835	690	82.6	68	8.1	77	9.2
VIII	2095000	513	467	91.0	18	3.5	28	5.5
IX	9079000	1077	929	86.3	106	9.8	42	3.9
X	2527000	1030	845	82.0	101	9.8	84	8.2
U.S.	73297000	9973	8254	82.8	1076	10.8	653	6.4

The 90.7% estimate of household pesticide usage translates into 66,461,655 households of a total of 73,297,000 in the United States using pesticides in their house, garden, or yard (Table 8).

The proportion of households using pesticides varied considerably among the 10 EPA regions (Figure 3). Region IV had the highest household usage proportion of 97.1% while Region VIII had the lowest of 83.3%. The chi-square test for homogeneity of proportions found the variation among the regional proportions to be statistically significant at less than the 1% level of significance (i.e., $p < .01$, based on a calculated chi-square value of 139.43 with 9 degrees of freedom). However, significance of the chi-square test merely indicates that some differences in the 10 proportions exist. Figure 4 permits one to explore these differences graphically; that is, in Figure 4 the interval about each estimated proportion represents the 95% confidence interval for the true unknown proportion of households using pesticides in each respective EPA region. Nonoverlapping confidence intervals indicate that the true proportions are significantly different at least at the 10% level of significance. For example, the proportion for Region IV is significantly higher than the proportion for each of the other regions. Similarly, the proportion for EPA region IX is significantly higher than the corresponding proportions for Regions I, II, V, VIII, and X but is not significantly different from the corresponding proportions for Regions III, VI, and VII. With these 10 proportions, 45 such pair-wise comparisons are possible. The result of each comparison need not be listed because of the ease and facility of such comparisons through the use of Figure 4.

The usage of pesticides by U.S. households has been investigated by place of use; that is, use in the house, garden, or yard. Pesticide usage in the house included application in the house and garage, as well as treatment of house foundation and house-dwelling pets. Pesticide usage in the

Table 8. Estimated percent and total number of households using pesticides in the house, garden or yard by EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Percent	Total	S.E.
1	88.3	3637738	47627
2	88.8	7839127	90384
3	90.6	7390547	81411
4	97.1	11554385	62730
5	87.3	13127321	151337
6	91.0	6842015	87457
7	93.5	3780290	38042
8	83.3	1745086	36199
9	92.6	8411571	77948
10	84.4	2133575	31725
U.S.	90.7	66461655	247774

Figure 3. Estimated percent of households using pesticides in the house, garden, or yard for each EPA region. National Household Pesticide Usage Study, 1976-1977.

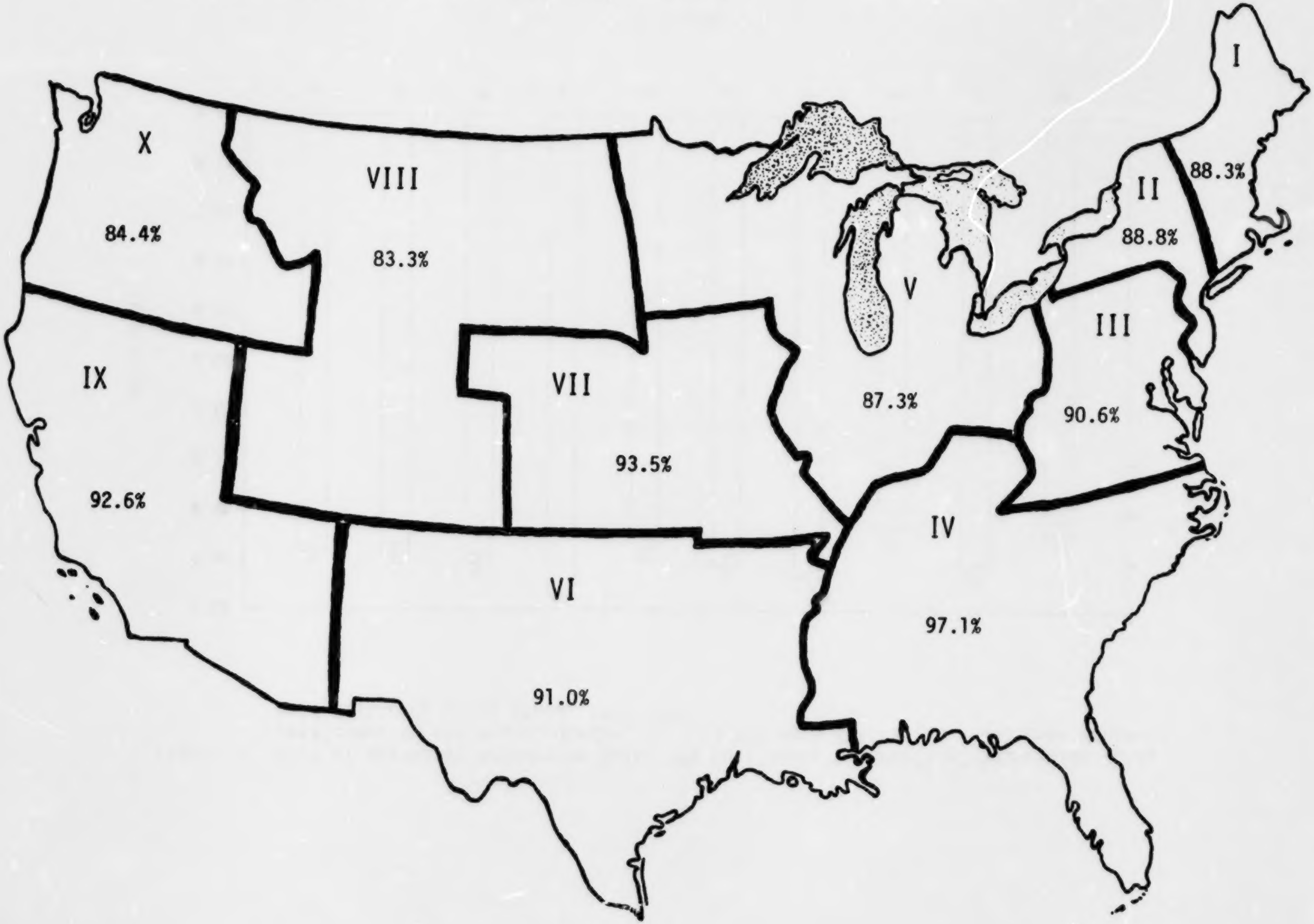
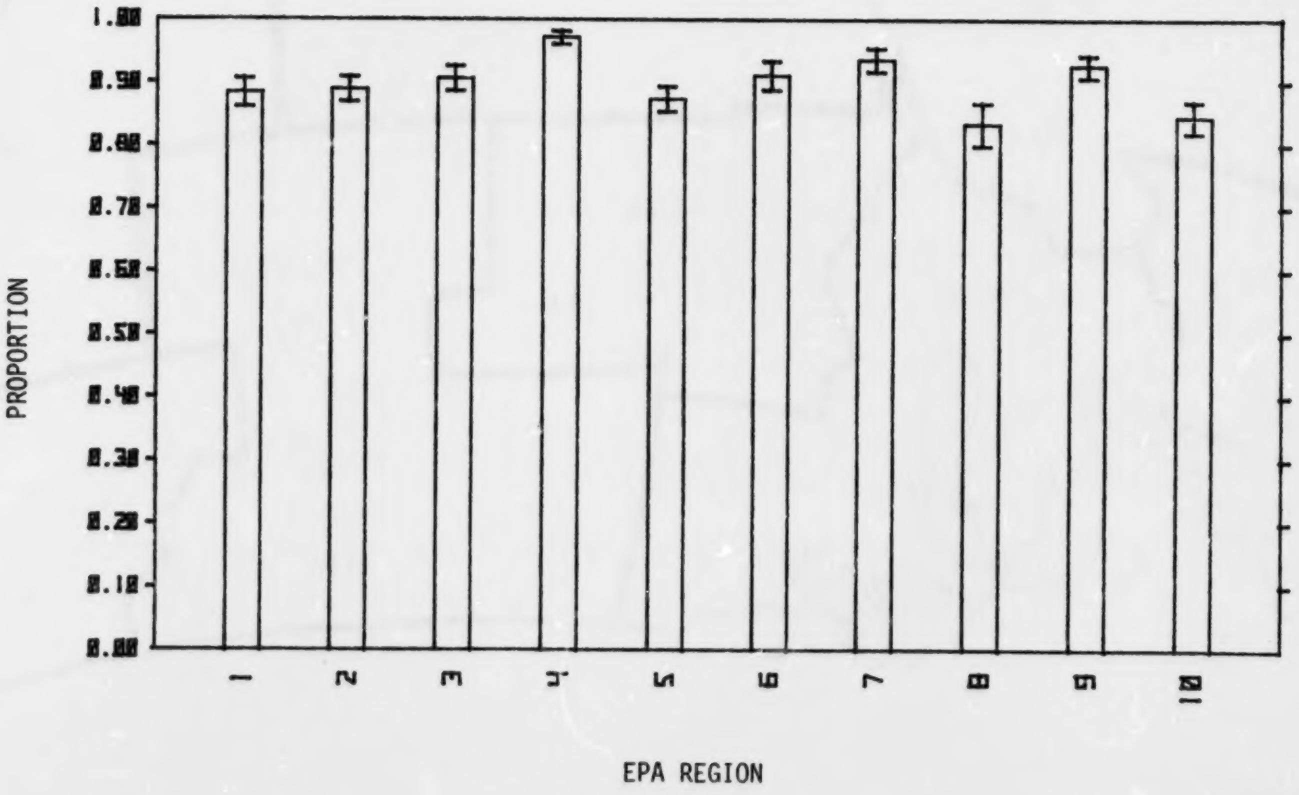

I
88.3%
II
88.8%
III
90.6%
IV
97.1%
V
87.3%
VI
91.0%
VII
93.5%
VIII
83.3%
IX
92.6%
X
84.4%

Figure 4. Plot of estimated proportion (with 95% confidence interval) of households using pesticides in the house, garden, or yard for each EPA region. National Household Pesticide Usage Study, 1976-1977.



garden included the application of pesticide compounds in flower beds and vegetable gardens. Pesticide usage in the yard included the application of pesticides to trees, shrubbery, lawn, and outside pets. Based on the total number of responding households, it is estimated that 83.7% of all households use pesticides in the house, 21.4% in the garden, and 28.7% in the yard. Corresponding national estimates of the number of households using pesticides by each place of use are presented in Table 9.

Overall, 83.7% of the responding households used pesticides in the house; however, a wide variation in the proportions of households reporting usage was noted by geographic region. In the southeastern EPA Region IV, it was estimated that 94.0% of all households used pesticides in the house. This compared to 65.5% in Rocky Mountain Region VIII (Figure 5). Results of the chi-square test for homogeneity of proportions showed a significant variation among the ten regional proportions ($p < .01$). Graphical comparisons of the true unknown usage proportions for the 10 EPA regions are depicted in Figure 6 which presents a plot of the estimated proportion (with corresponding 95% confidence interval) of households using pesticides in the house; the true proportion for Region IV is significantly greater ($p \leq .10$) than the proportions for all other regions. Additionally, the true proportions for Regions VIII and X are significantly less ($p \leq .10$) than the proportions for the other eight EPA regions.

It was estimated that, for the entire United States, 21.4% of the households used pesticides in the garden. There was moderate variation of the proportions of households using pesticides in the garden among the 10 EPA regions. The range of the proportion variation was from a high of 27.7% in

Table 9

Estimated Total Number of Households Having Used Pesticides in the House, Garden, and Yard by EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	House		Garden		Yard	
	Total	S.E.	Total	S.E.	Total	S.E.
1	3366899	57237	919426	62565	1182880	67847
2	7438791	104387	1255422	101256	1831277	117109
3	7180420	90595	1158759	98451	2275200	125580
4	11188845	88704	2939848	166489	4504570	185955
5	11902355	184727	3437983	191439	5135584	215582
6	6300075	113041	1412215	120353	3688497	153630
7	3402013	56458	965927	67085	1784725	77181
8	1372741	46126	477807	41210	1081584	48814
9	7487227	113632	2510368	134318	5647178	145376
10	1715827	40778	613510	39276	1209372	44191
U.S.	61355193	311514	15691267	358461	28340866	412519

Figure 5. Estimated percent of households using pesticides in the house, garden or yard for each EPA region. National Household Pesticide Usage Study, 1976-1977.

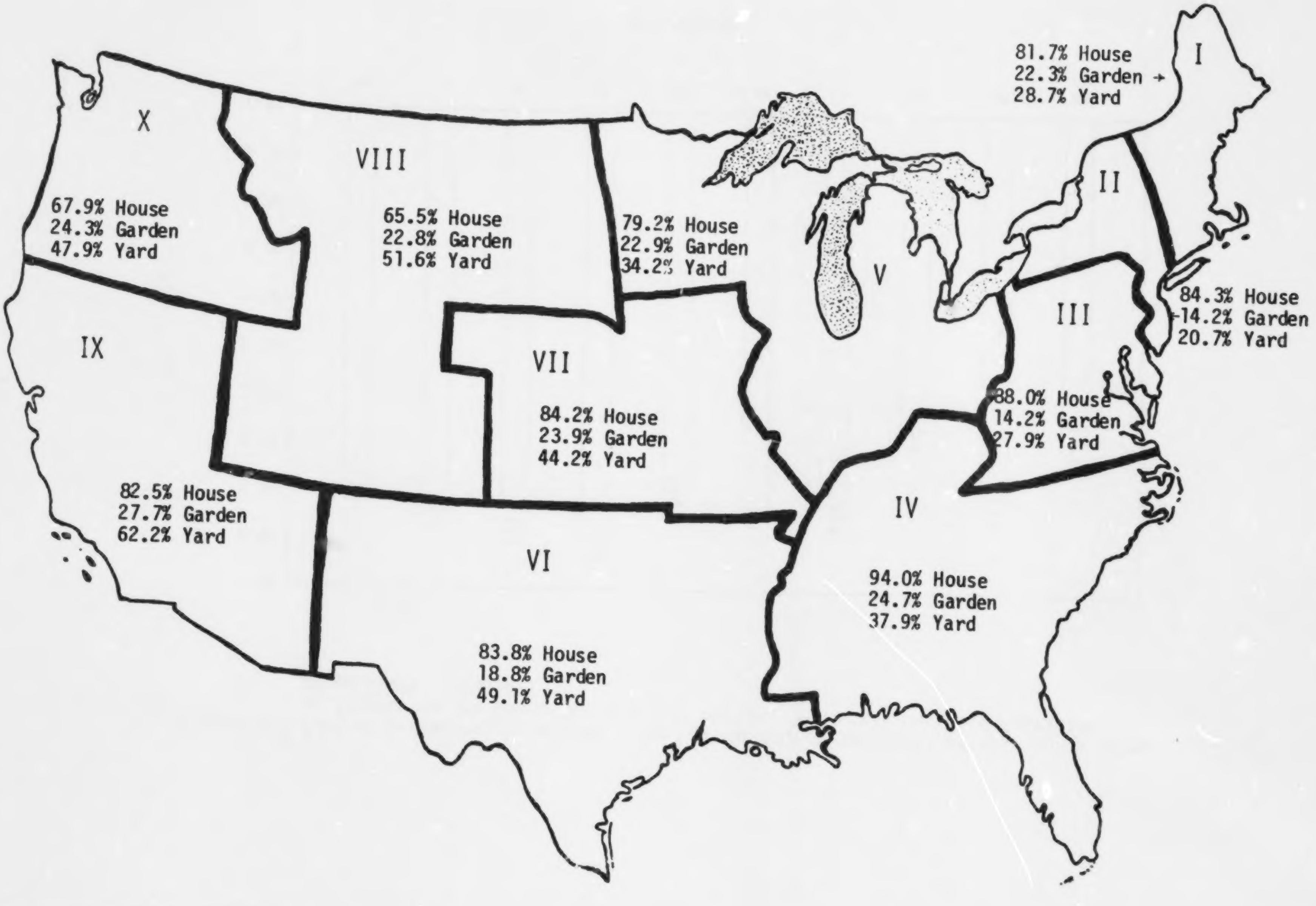
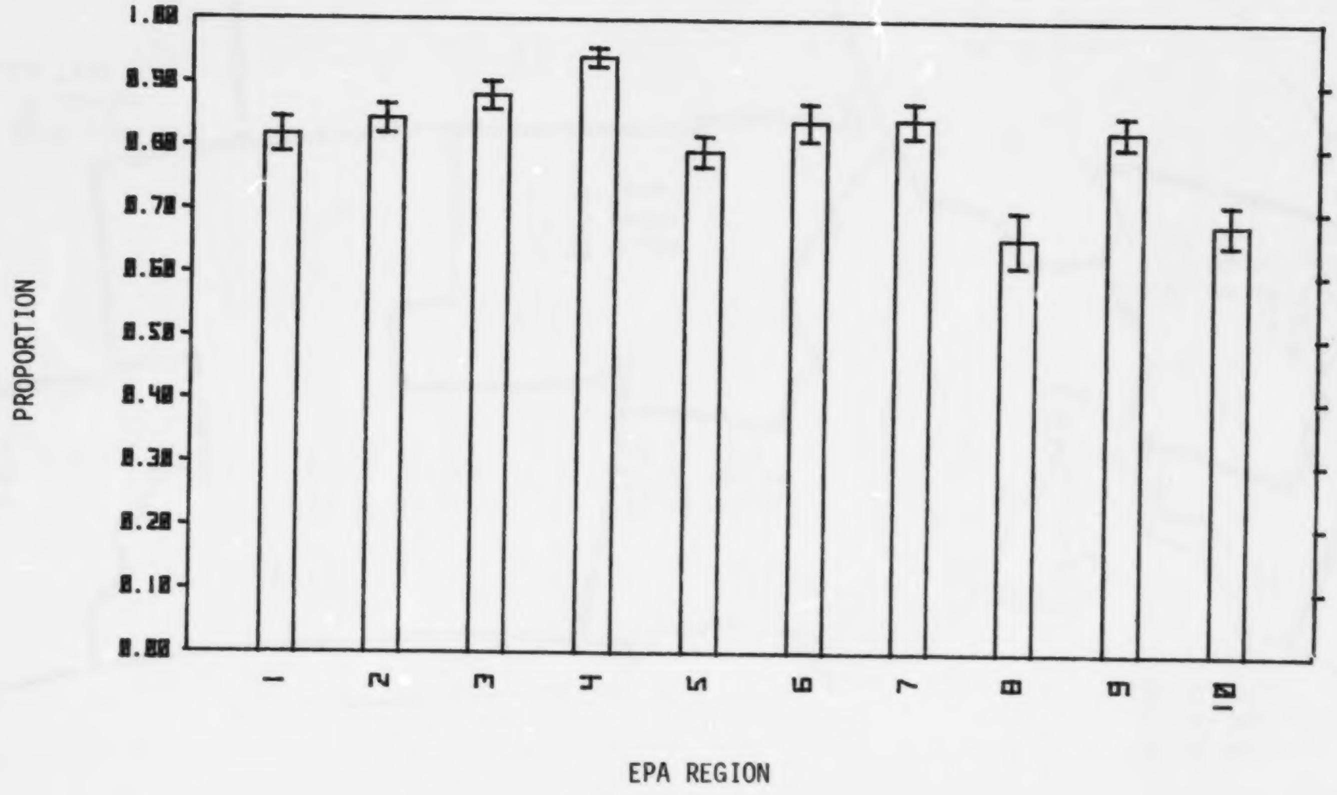

X
67.9% House
24.3% Garden
47.9% Yard
VIII
65.5% House
22.8% Garden
51.6% Yard
79.2% House
22.9% Garden
34.2% Yard
V
81.7% House
22.3% Garden →
28.7% Yard
I
II
84.3% House
14.2% Garden
20.7% Yard
III
88.0% House
14.2% Garden
27.9% Yard
IX
82.5% House
27.7% Garden
62.2% Yard
VII
84.2% House
23.9% Garden
44.2% Yard
VI
83.8% House
18.8% Garden
49.1% Yard
IV
94.0% House
24.7% Garden
37.9% Yard

Figure 6. Plot of estimated proportion (with 95% confidence interval) of households using pesticides in the house for each EPA region. National Household Pesticide Usage Study, 1976-1977.



Region IX to a low of 14.2% in Regions II and III (Figure 5). Figure 7 shows the corresponding plot of these estimated proportions and the approximate 95% confidence intervals; the true unknown proportion for Region IX is significantly greater (at the 10% level) than the proportions for Regions II, III, and VI. The proportions for Regions II and III are significantly less than those for Regions I, IV, V, VII, VIII, IX, and X ($p \leq .10$).

An estimated 38.7% of all households in the United States use pesticides in their yards. The estimated percent of households in each EPA region using yard pesticides varied from a high of 62.2% for Region IX to a low of 20.7% for Region II (Figure 5). The corresponding estimated proportions and 95% confidence intervals, as seen in Figure 8, confirm that the proportion for Region IX was significantly greater than all other proportions ($p \leq .05$) with the proportion for Region II significantly less than all others. By examination of Figures 5 and 8, one can see that the proportions for four of the five eastern EPA regions (i.e., Regions I, II, III, and V) are significantly lower than the proportions of the remaining five EPA regions.

For each EPA region, the mean number of pesticide containers (used or stored) was estimated and found to differ significantly ($p < .01$) among the 10 EPA regions. Region IX had the highest mean value of 2.3 containers per household while Regions II and III had the lowest mean of 1.3 containers (Figure 9). Overall, the national estimated mean number of containers per household was 1.7. Corresponding estimates of total number of pesticide containers are presented in Table 10.

An estimated 20.6% of all households in the United States stored unused pesticides that had not been used in the past 12 months. As shown in Figure 10, the highest proportion of households storing unused pesticides was 27.3% for Region VIII and the lowest was 15.6% in Region IV. Corresponding national estimates are shown in Table 10.

Figure 7. Plot of estimated proportion (with 95% confidence interval) of households using pesticides in the garden. National Household Pesticide Usage Study, 1976-1977.

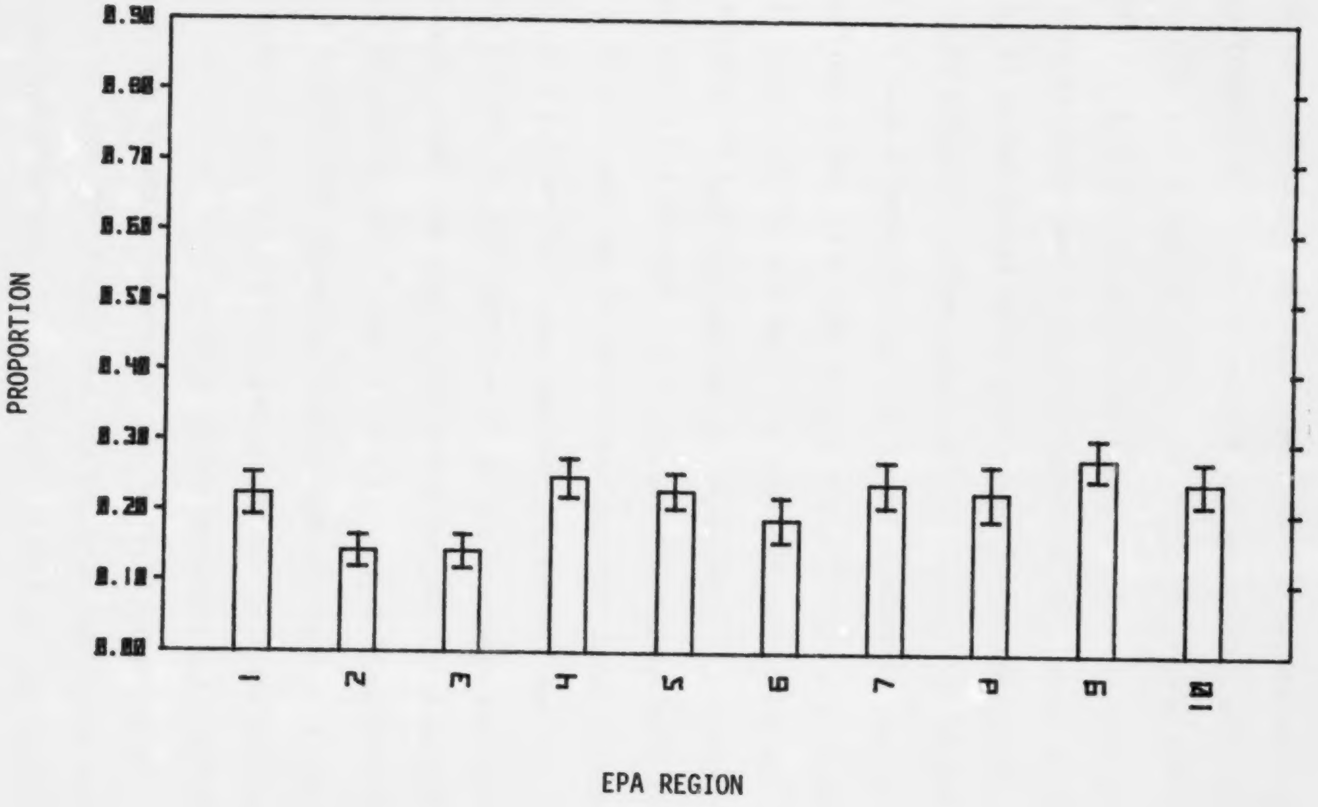


Figure 8. Plot of estimated proportion (with 95% confidence interval) of households using pesticides in the yard. National Household Pesticide Usage Study, 1976-1977.

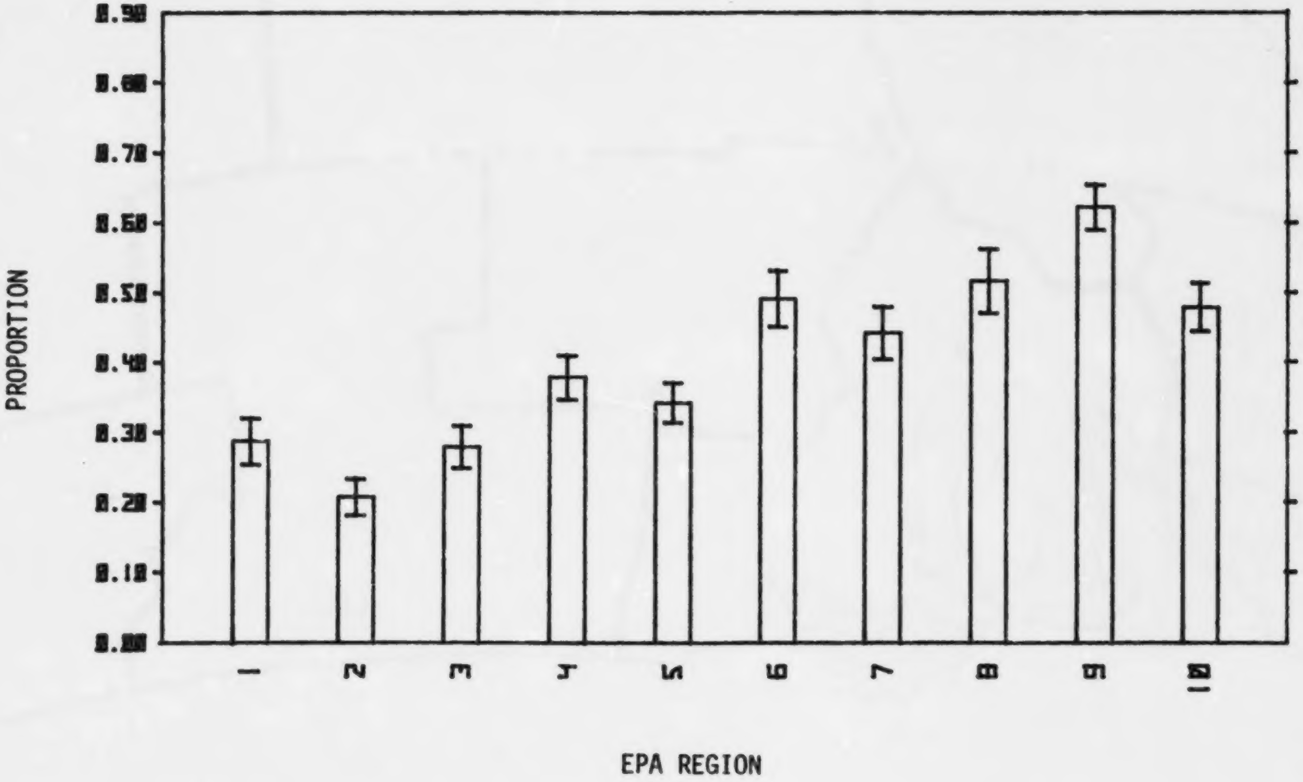


Figure 9. Estimated mean number (and standard deviation) of observed pesticide containers per household. National Household Pesticide Usage Study, 1976-1977.

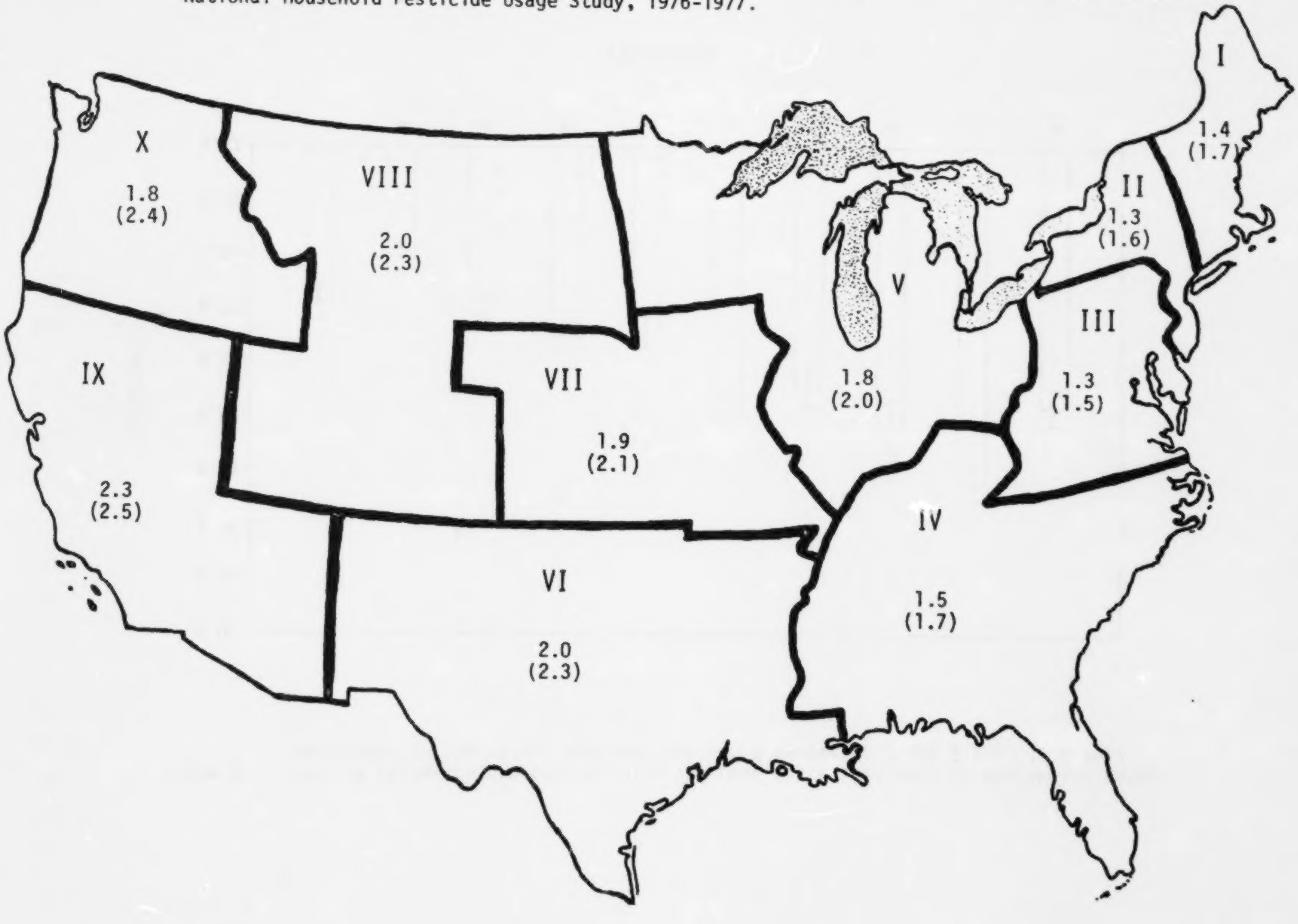
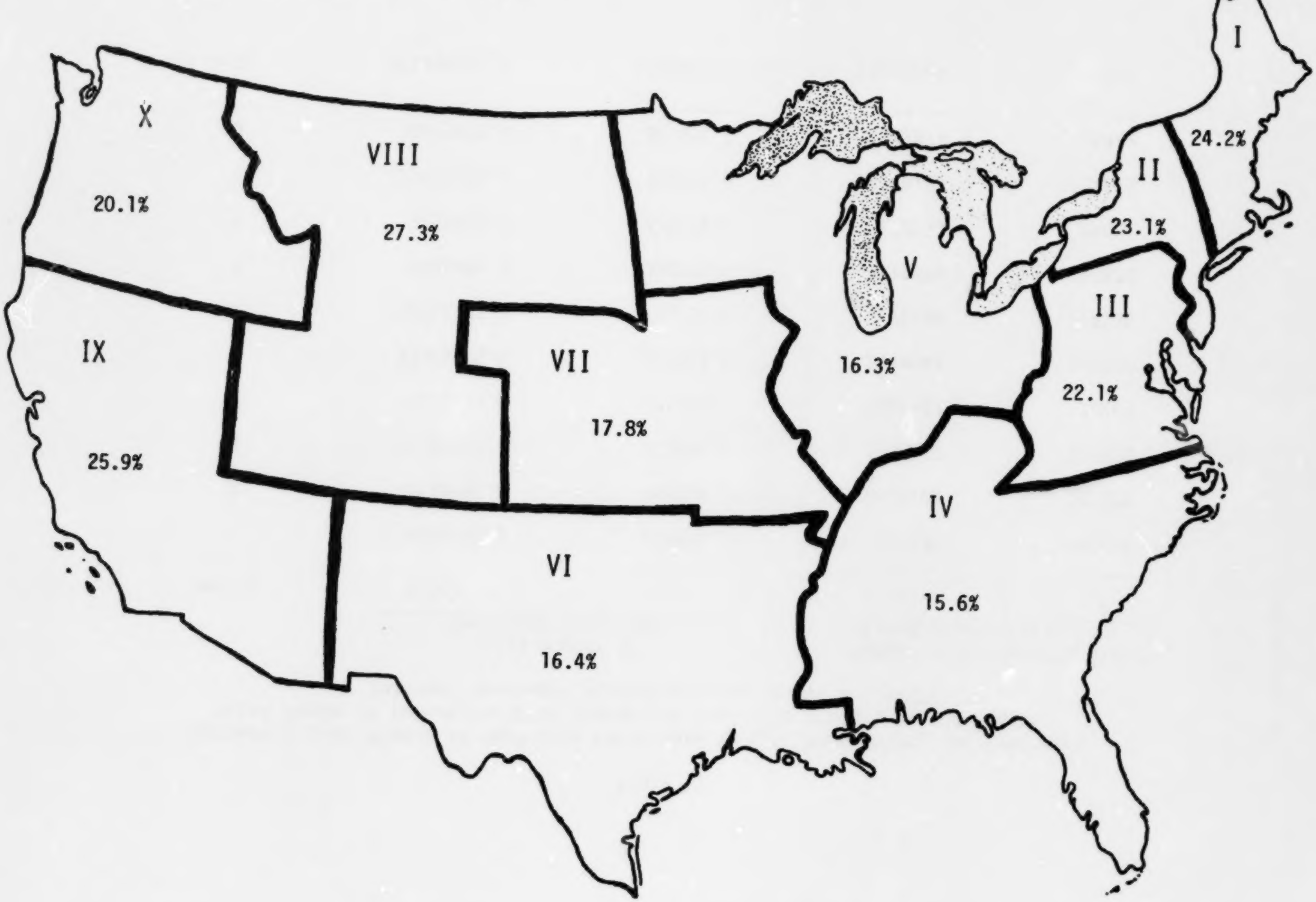

I
1.4
(1.7)
II
1.3
(1.6)
III
1.3
(1.5)
IV
1.5
(1.7)
V
1.8
(2.0)
VI
2.0
(2.3)
VII
1.9
(2.1)
VIII
2.0
(2.3)
IX
2.3
(2.5)
X
1.8
(2.4)

Table 10

Estimated Total Number of Pesticide Containers in U.S. Households, and Estimated Total Number of Households With Stored But Unused Pesticides by EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Total Number of Pesticide Containers		Number of Households With Stored,Unused Pesticides	
	Total	S.E.	Total	S.E.
1	5626750.0	243805.9	999030	64146
2	11792591.2	461884.5	2039702	122329
3	10728362.4	410908.8	1806857	116970
4	18073613.6	631364.3	1861187	138269
5	27349375.8	893918.8	2448044	168918
6	14756727.3	703600.9	1235688	114196
7	7490491.3	320275.8	719879	59870
8	4252805.1	225329.4	572633	44063
9	20933496.2	756863.8	2348192	132815
10	4449912.4	204610.5	507877	35472
U.S.	125454025.3	1703657.5	14539090	343333

Figure 10. Estimated percent of households with stored but unused pesticides. National Household Pesticide Usage Study, 1976-1977.


I
24.2%
II
23.1%
III
22.1%
IV
15.6%
V
16.3%
VI
16.4%
VII
17.8%
VIII
27.3%
IX
25.9%
X
20.1%

As mentioned previosuly, households were also considered to use pesticides if they employed a commercial applicator, used mothballs, or used pet insecticides. Table 11 depicts the national estimates of the total number of households treated by a commercial applicator and treated for termites, respectively, for each EPA region. Greater insight into the relative use of pesticides by commercial and termite control applicators can be obtained by the examination of Figures 11 through 13. The proportion of households utilizing commercial applicators and termite control was significantly different ($p < .01$) among the 10 EPA regions. As shown in Figures 11 and 12, the proportion of households in Region IV (44.2%) using commercial applicators was significantly greater than proportions from the remaining EPA regions. Similarly, the proportion of the population utilizing termite control in Region IV (54.5%) was significantly greater than proportions for the other regions (Figures 11 and 13). The proportions of households using a commercial applicator and termite control was the least (8.9% and 2.5%, respectively) in Region VIII.

Table 12 depicts national estimates of the total number of households using no-pest strips, mothballs, and disinfectants for each EPA region. A total of 16.4% of the households utilized no-peststrips; 35.8% used mothballs, flakes, or crystals; and 90.6% used disinfectants.

The estimated total numbers of households using insecticide impregnated pet collars for insect control. insecticidal shampoos, insecticidal powders, and other pesticides such as insecticide sprays and dips on pets are presented in Tables 13 and 14. Proportions of responding sampled households that used or applied the pet insecticides on their pets were as follows: 28.4% used insecticide impregnated pet collars; 13.3% used insecticide pet shampoo; 13.1 used insecticide pet powder; and 2.0% used other pesticides for their pets.

Table 11

Estimated Total Number of Households Treated by Commercial Applicator and Estimated Total Number of Households Treated for Termites by EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Treated By Commercial Applicator		Treated for Termites	
	Total	S.E.	Total	S.E.
1	569169	51849	491245	54379
2	2099577	124783	1320531	123105
3	1954079	120875	3365175	147564
4	5262364	187227	6481814	200976
5	1497894	138773	732323	104241
6	2180119	141002	2208425	157571
7	722041	60030	1295792	76743
8	186222	28137	52638	16456
9	1877678	126127	3039607	163944
10	355510	31300	149097	23177
U.S.	16704653	358254	19136647	386715

Figure 11. Estimated percent of households treated by a commercial pesticide applicator or treated for termites for each EPA region. National Household Usage Study, 1976-1977.

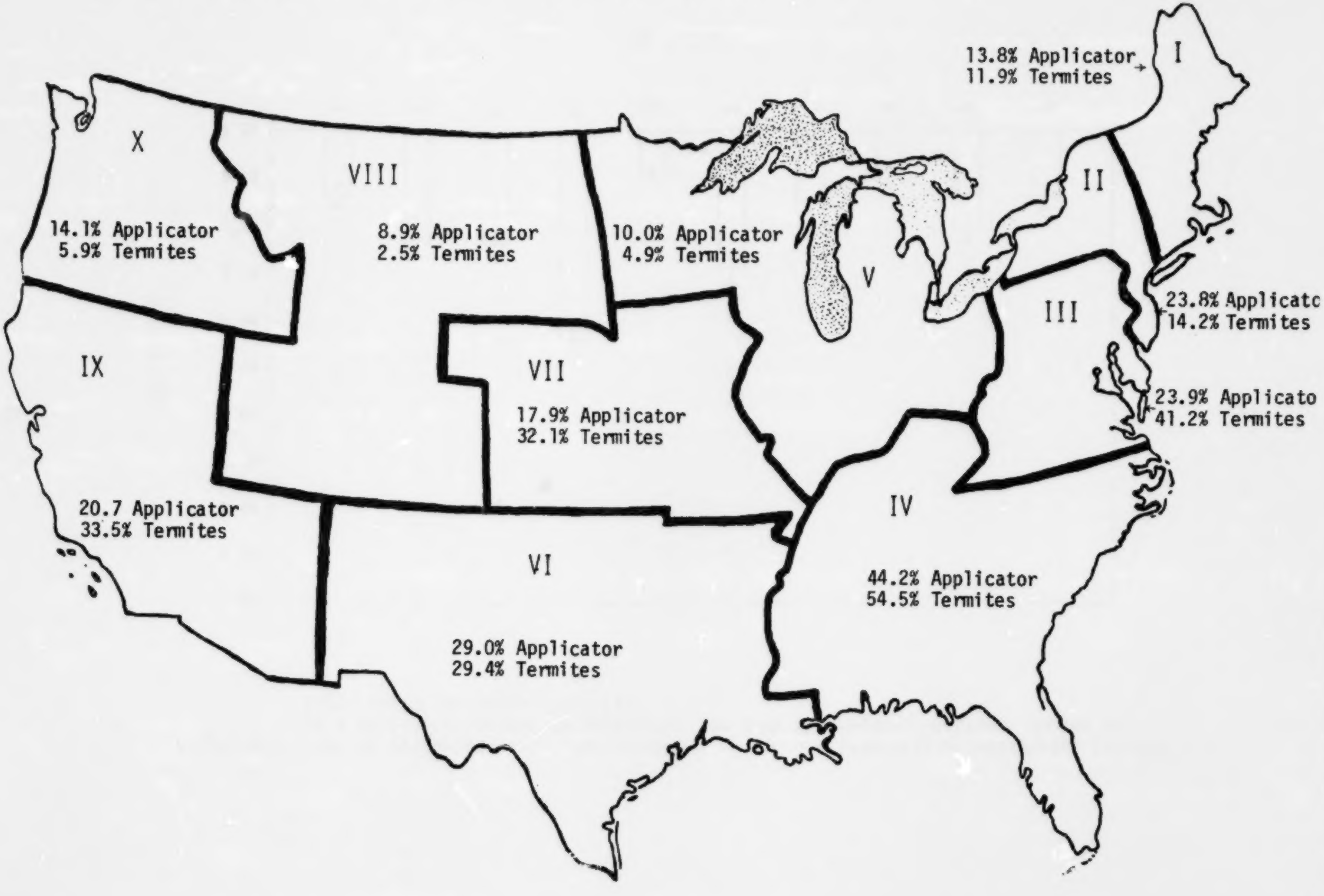

13.8% Applicator
11.9% Termites
I
X
VIII
II
14.1% Applicator
5.9% Termites
8.9% Applicator
2.5% Termites
10.0% Applicator
4.9% Termites
V
III
23.8% Applicatc
14.2% Termites
IX
VII
23.9% Applicato
41.2% Termites
17.9% Applicator
32.1% Termites
20.7 Applicator
33.5% Termites
IV
VI
44.2% Applicator
54.5% Termites
29.0% Applicator
29.4% Termites

Figure 12. Plot of estimated proportion (with 95% confidence interval) of households treated by a commercial pesticide applicator for each EPA region. National Household Pesticide Usage Study, 1976-1977.

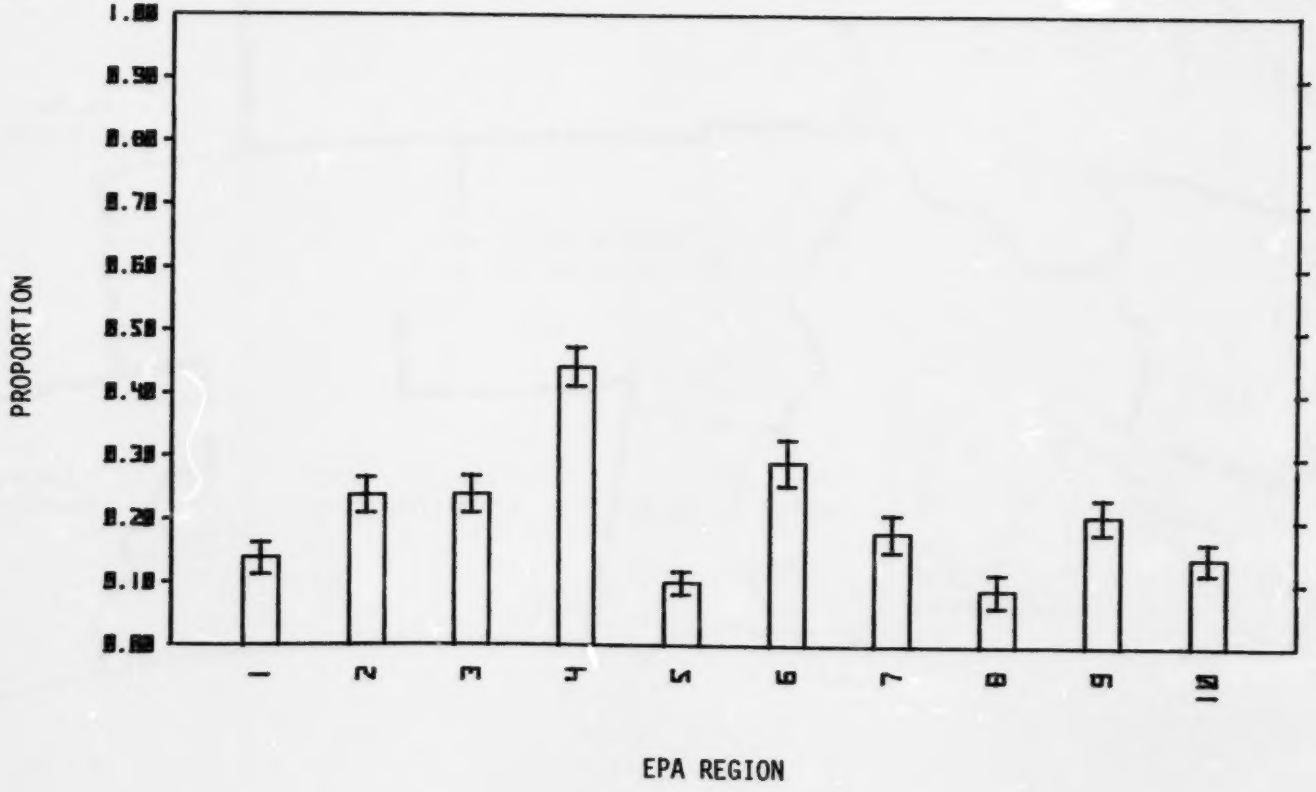


Figure 13. Plot of estimated proportion (with 95% confidence interval) of households treated for termites for each EPA region. National Household Pesticide Usage Study, 1976-1977.

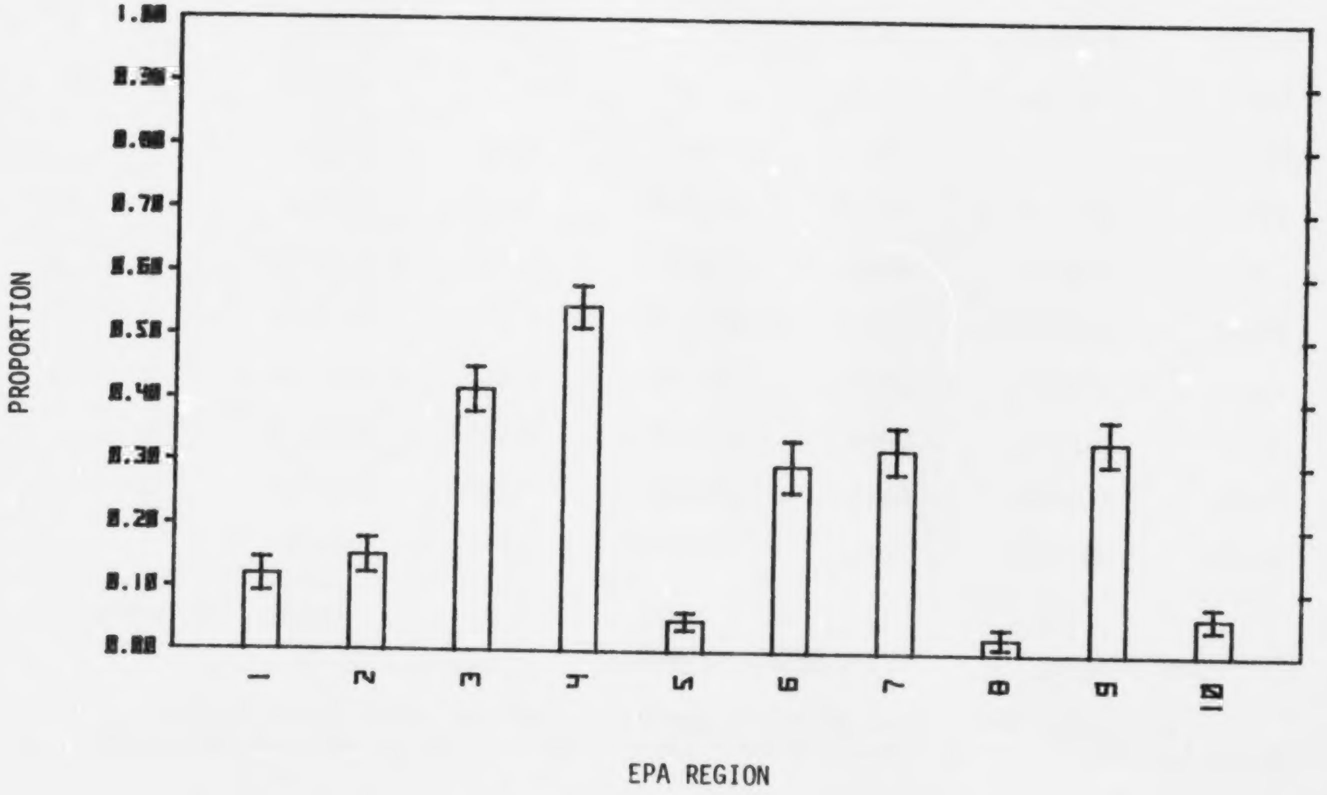


Table 12

Estimated Total Number of Households Using No-Pest Strips, Mothballs, and Disinfectants by EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	No-Pest Strips		Mothballs,Crystals,Etc.		Disinfectants	
	Total	S.E.	Total	S.E.	Total	S.E.
1	493661	48318	1964663	74031	3728780	43695
2	1403297	104437	4044862	142979	7966079	85686
3	1173895	97995	3605358	138993	7426950	80268
4	1444213	122621	4449382	182861	11098304	94291
5	2667232	174212	5405734	219449	12846426	161085
6	1041311	106173	2123804	138488	7050801	73981
7	633422	56011	1195142	70619	3512608	52554
8	574654	43486	419000	38903	2024855	17826
9	2092117	126118	2606842	136314	8486247	74024
10	499383	34740	453409	33555	2249984	27570
U.S.	12023186	318817	26268196	415001	66391034	255590

Table 13

Estimated Total Number of Households That Have Used Insect Collars on Pets, or Pet Insecticide Shampoos, by EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Insecticide Collars Total	Insecticide Collars S.E.	Insecticide Shampoos Total	Insecticide Shampoos S.E.
1	1309775	69017	459075	46695
2	2019743	119915	701649	77260
3	2618436	130197	1107088	95619
4	4332639	180674	2559514	154363
5	3549976	192882	1975533	153502
6	1689322	127647	794975	94047
7	976428	66045	453582	48739
8	287109	33375	89722	19649
9	3206667	142911	1306901	105303
10	834330	40979	336533	29624
U.S.	20824427	387057	9784570	297079

Table 14

Estimated Total Number of Households That Have Used Pet Insecticide Powders and Other Pesticides on Pets By EPA Region.
National Household Pesticide Usage Study, 1976-1977.

	Insecticide Powders		Other Pesticides	
Region	Total	S.E.	Total	S.E.
1	507118	43754	54224	17045
2	757042	79977	46847	20906
3	1096262	95168	185233	42035
4	2695229	157404	375567	66414
5	1439180	133620	123923	41156
6	1142777	109801	177720	46972
7	342658	43075	107125	24931
8	76263	18176	36435	12783
9	1257397	103618	278741	51891
10	300833	28253	57226	12987
U.S.	9614758	293663	1443041	120216

Household Pesticide Usage, Storage, and Disposal Practices

Several key questions were asked to investigate the pesticide usage, storage, and disposal practices of respondents in the National Household Pesticide Usage Study. For example, where do you buy your pesticides? what information do you obtain from reading the label? and where do you dispose of unwanted pesticides? In the following series of tables, (Tables 15 through 18) answers to the above questions are given in terms of the proportions of the responding sample households. The balance of the nonspecified household proportions listed under the "primary" column is attributable to the inability of the respondents to define their primary place, method, or source of information. A second column in this series of tables (Tables 15 through 18) presents the proportions of the responding sample households that utilized secondary place, method, or source of information. For example, Table 15 reveals that 41.1% of the responding households bought pesticides from the grocery store; this location was the primary purchase place for 35.1% of the households.

For 29.7% of the responding households, the label was used as their primary source of information on pesticide usage, storage, and disposal (Table 16). Over 49% of the households interviewed noted pesticide application information was obtained from reading the label; 34.8% cited precautionary measures; and 14.8% replied that they obtained pesticide preparation instructions from the label (Table 17). The ingredients and antidotes were noted by 10.2% and 6.2% of the responding population, respectively. Application instructions and precautionary measures were the two leading types of information primarily obtained by reading the label for 33.0% and 16.0% of the respondents respectively.

Table 15. Primary and secondary place of pesticide purchase. National Household Pesticide Usage Study, 1976-1977. (In estimated percentages.)

	Primary Place of Purchase	Secondary Place of Purchase	Total
Grocery	35.1%	6.0%	41.1%
Discount	9.3%	3.8%	13.1%
Hardware	9.0%	3.9%	12.9%
Nursery	5.9%	2.9%	8.8%
Feed	3.3%	1.7%	5.0%
Drug	2.3%	2.0%	4.3%
Sales person other than retail store	.4%	.5%	.9%
Other	5.5%	2.2%	7.7%
Nonspecified	29.2%	----	-----

Table 16. Primary and secondary sources of information on pesticide usage. National Household Pesticide Usage Study, 1976-1977. (In estimated percentages.)

	Primary Source of Information	Secondary Source of Information	Total
Label	29.7%	6.6%	36.3%
Mass media	10.9%	6.0%	16.9%
Neighbor, friend, or relative	9.8%	3.5%	13.3%
Sales person	3.6%	2.1%	5.7%
Agriculture extension service	1.8%	1.4%	3.2%
Health department	.2%	.1%	.3%
Other	11.3%	2.7%	14.0%
Nonspecified	32.7%	----	-----

Table 17. Types of information obtained from reading the pesticide label. National Household Pesticide Usage Study, 1976-1977. (In estimated percentages.)

	Primary Information Obtained	Secondary Information Obtained	Total
Applications	33.0%	16.4%	49.4%
Precautionary measures	16.0%	18.8%	34.8%
Preparation	2.9%	11.9%	14.8%
Ingredients	2.7%	7.5%	10.2%
Antidotes	.5%	5.7%	6.2%
Other	8.4%	2.7%	11.1%
Nonspecified	36.5%	-----	-----

The following table (Table 18) deals with the householders' methods of disposing unwanted pesticides, diluted pesticides, and empty pesticide containers. As shown in Table 18, 31.3% of the households disposed of their unwanted pesticides primarily by using them entirely, while 20.4% placed pesticides with other refuse as their primary disposal method. Similarly, the majority of respondents (17.9%) primarily disposed of pesticides diluted for use by using them entirely. An additional 5.8% of the responding population primarily discarded their diluted pesticides by placing them with other household refuse. Empty pesticide containers were also disposed primarily by discarding them with other household refuse (67.6%). Only 13 of the 8254 responding households used empty pesticide containers to store other pesticides and 19 households used empty pesticide containers to store other substances. Investigation of the use of pesticide application equipment revealed that 147 of the 8254 households used application equipment to apply more than one pesticide. It is of considerable interest to note that 104 householders used application equipment for other substances.

Health Effects of Household Pesticide Use

In the National Household Pesticide Usage Study, an attempt was made to determine if householders suffered any ill health effects associated with use of pesticides. Of the 8254 responding households, 253 stated that they or some member of their household experienced dizziness, headache, nausea, or vomiting after using pesticides (Table 19). However, only 22 respondents said that they or another member of their household experienced severe adverse effects related to pesticide use and were treated by a physician. Of the 8254 responding households, only seven had a member which had a diagnosed pesticide poisoning. Only one of these seven diagnosed pesticide poisonings was hospitalized.

Table 18. Methods of disposing of unwanted pesticides, unused-diluted pesticides, and empty pesticide containers. National Household Usage Study, 1976-1977. (In estimated percentages.)

	Primary Method of Disposal	Secondary Method of Disposal	Total
Used Up	31.3%[a]	1.4%	32.7%
	17.9%[b]	.6%	18.5%
	-----[c]	----	-----
Refuse	20.4%	2.0%	22.4%
	5.8%	.4%	6.2%
	66.5%	1.1%	67.6%
Sink or Toilet	1.3%	.5%	1.8%
	2.0%	.2%	2.2%
	-----	----	-----
Buried	1.2%	.3%	1.5%
	.5%	.2%	.7%
	.8%	.2%	1.0%
	.6%	.4%	1.0%
	1.9%	.5%	2.4%
	-----	----	-----
Burned	.4%	.2%	.6%
	.1%	.1%	.2%
	1.7%	.5%	2.2%
Street Gutter	.2%	.1%	.3%
	.4%	.1%	.5%
	-----	----	-----
Given Away	.2%	.2%	.4%
	-----	----	-----
	-----	----	-----
Other	1.0%	.2%	1.2%
	.8%	.2%	1.0%
	1.2%	.3%	1.5%
Nonspecified	43.4%	----	-----
	70.6%	----	-----
	29.8%	----	-----

---

[a] Percentage for disposal of unwanted pesticides.

[b] Percentage for disposal of unused-diluted pesticides.

[c] Percentage for disposal of empty pesticide containers.

Table 19

Estimated Total Number of Households Having Experienced Nausea, Dizziness, Headaches, or Vomiting After Using Pesticides by EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Total	S.E.
1	42927	15108
2	268617	50013
3	273629	50867
4	505993	77364
5	510713	86129
6	314698	61659
7	89800	23751
8	68464	17405
9	328157	58856
10	98072	17566
U.S.	2501071	164809

Observed Pesticides

As a portion of the questionnaire, each interviewed household was asked to provide information regarding all pesticides that they had used or stored in the past 12 months. This information included the total number of ounces used of each pesticide and the number of ounces currently stored. Products such as pet insecticides and no-pest strips were not included in this list since their use had been recorded in other portions of the questionnaire (Tables 12 through 14).

As mentioned previously, the observed pesticides were subsequently coded according to the seven-digit Pindex system which classified the pesticides by ingredient. In Appendix C, Pindex numbers of all pesticides observed in the study are listed along with the observed frequency and the relative frequency (i.e., frequency divided by the observed total number of pesticides) of each pesticide observed in this study.

Pesticides were coded as unknown insecticide (Pindex 0008540) when described as "a bug spray" by the householder and the interviewer was not able to inspect the container or storage site. Among the 8254 interviewed households, 1756 containers of an unknown insecticide were recorded as being used and/or stored (Table 20). The 14 known pesticides observed most frequently in the study were: 1) dichlorvos; 2) resmethrin; 3) pyrethrin; 4) chlordane; 5) Sevin; 6) 2-4-D and silvex; 7) diazinon; 8) Baygon and DDVP; 9) malathion; 10) metaldehyde; 11) warfarin; 12) arprocarb; 13) captan, methoxychlor, rotenone, and rotenoids; 14) ovex, lindane, rotenone, and folpet. Tables 21 through 34 present the number of observed containers as well as the total observed and estimated amount of formulations (used and stored) containing these pesticides for each EPA region and the United States.

Table 20

Estimated Total Amount and Standard Error of Ounces Used and Stored of Unknown Insecticide Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Ounces Used		Ounces Stored	
	Total	S.E.	Total	S.E.
1	11232366.7	2946155.5	2615250.0	615282.4
2	32493640.0	9753232.7	13528301.8	4937969.1
3	10406132.4	1944335.8	14917351.9	8738277.0
4	95971473.0	13759151.9	31386087.5	5068952.5
5	52140305.7	12189433.6	23491184.7	3191503.7
6	42245479.3	6432729.2	17290710.7	8282589.1
7	11162530.4	3995643.4	2664717.4	693425.5
8	1821349.0	433479.3	1081145.6	264636.2
9	25917662.0	9946015.7	8834678.1	1214590.6
10	2763252.1	401158.7	2978570.4	828282.0
U.S.	286154190.6	24537718.1	118787998.2	14433052.5

As shown in Table 21, 1207 dichlorvos containers (Pindex 0401281) were observed in 8254 households. Similarly, 866 containers of resmethrin (Pindex 1016815), 787 of pyrethrin (Pindex 0803247), 674 of chlordane (Pindex 0200725), and 618 of Sevin or carbaryl (Pindex 2000685) were recorded as used and/or stored (Tables 22 through 25).

The sixth most frequently occurring known pesticide was a combination of 2,4-D and silvex (pindex 0308049). Pesticides for household use are very often combinations so that they can be used for control of a variety of pest problems (Table 26).

Of the 14 known pesticides observed most frequently, the seventh, diazinon (Pindex 0401109), was observed 449 times, the eighth, Baygon and DDVP (Pindex 0008144), was observed 402 times; and the ninth, malathion (Pindex 0402313), 382 times (Tables 27 through 29). Containers of the pesticides metaldehyde (Pindex 2502409), warfarin (Pindex 1004183), and arprocarb or Baygon (Pindex 2002152) were recorded as being used or stored 367, 340, and 339 times, respectively (Tables 30 through 32). The final two pesticides of the leading 14 are the following combination pesticides (Tables 33 and 34): captan, methoxychlor, rotenone, and rotenoids (Pindex 6006712) which was observed 274 times, and ovex, lindane, rotenone and folpet (Pindex 6006696) observed 263 times.

In the National Household Pesticide Usage Study, a total of 14, 037 pesticide containers were observed as being used or stored in the 8254 sampled households. The 14 leading known pesticides and the unknown insecticide classification accounted for 65.6% of all pesticide containers observed.

Table 21

Estimated Total Amount and Standard Error of Ounces Used and Stored of Dichlorovos Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

	Ounces Used		Ounces Stored	
Region	Total	S.E.	Total	S.E.
1	14988816.7	4510145.6	4443283.3	461244.3
2	35157053.1	8250867.6	6869769.0	816238.6
3	15040557.5	2456399.4	13950662.0	5765995.6
4	44230636.2	11181601.4	9346807.3	1124054.7
5	27499872.6	4961120.6	15938980.9	2256056.3
6	28258884.3	4410774.0	8682619.8	1095248.0
7	10916556.5	1372115.1	6963404.3	961114.6
8	2839689.5	631336.0	2108458.2	349331.6
9	22389654.5	3149268.9	9127864.4	943398.1
10	1333777.5	314526.0	1013790.5	323788.0
U.S.	202655498.3	16608614.9	78445639.8	6612047.1

Table 22

Estimated Total Amount and Standard Error of Ounces Used and Stored of Resmethrin Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

	Ounces Used		Ounces Stored	
Region	Total	S.E.	Total	S.E.
1	7787633.3	1049872.2	4200250.0	455922.0
2	12049648.3	2196799.1	6970795.0	792044.1
3	8937142.9	1552190.5	5250453.0	757633.3
4	8972467.1	2386137.3	2737362.8	569089.0
5	33136662.4	4194302.7	16212611.5	1375681.6
6	13191619.8	3802944.6	3192322.3	598785.9
7	6143491.3	1335471.6	2477308.7	368601.5
8	2530149.9	465419.8	2557066.4	350697.4
9	8531719.1	1581513.5	4436884.8	625356.9
10	2147202.4	488596.7	1267985.8	195699.7
U.S.	103427736.4	7129206.9	49303040.3	2161569.9

Table 23

Estimated Total Amount and Standard Error of Ounces Used and Stored of Pyrethrin Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Ounces Used		Ounces Stored	
	Total	S.E.	Total	S.E.
1	3798716.7	684399.8	1616700.0	300089.1
2	9863812.7	1265165.0	6961610.8	788448.8
3	5771707.3	979352.1	4008919.9	608927.8
4	10656998.0	2344373.3	4316610.6	766534.0
5	39224942.7	6537251.2	16800917.2	2154252.4
6	7154776.9	1448349.1	12359380.2	7659611.4
7	3420208.7	634142.3	1587117.4	285486.1
8	1632933.6	385590.2	960021.4	216306.6
9	13398610.3	1843420.4	6166683.5	898211.2
10	1931884.0	370749.3	1004818.9	156808.8
U.S.	96854590.9	7579188.7	55782779.9	8120356.3

Table 24

Estimated Total Amount and Standard Error of Ounces Used and Stored of Chlordane Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

	Ounces Used		Ounces Stored	
Region	Total	S.E.	Total	S.E.
1	8580133.3	2018696.9	7206466.7	2002828.4
2	3434884.5	1148094.2	4041040.6	1130010.6
3	4369059.2	1473765.1	6539372.8	1784611.5
4	14564174.0	5589632.2	6504161.3	1326709.5
5	9754929.9	2564381.0	12286012.7	1846019.7
6	6869082.6	2290280.2	8061545.5	1780599.4
7	2793560.9	585004.4	3566621.7	818342.9
8	1628447.5	370909.0	2063597.4	392310.5
9	9567643.7	1569499.3	12137909.6	1467883.5
10	433627.2	142136.9	959960.9	237939.1
U.S.	61995543.0	7320792.1	63366689.2	4454936.0

Table 25

Estimated Total Amount and Standard Error of Ounces Used and Stored of Sevin Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Ounces Used		Ounces Stored	
	Total	S.E.	Total	S.E.
1	1621983.3	351315.9	1695950.0	395167.4
2	10717941.7	5364811.2	6970795.0	2119090.5
3	11221184.7	2550290.5	4710243.9	829399.8
4	73218606.7	16398086.7	31467974.4	7563413.1
5	12108152.9	2631502.8	10794726.1	2359082.7
6	15924347.1	5330895.4	18607388.4	5582907.9
7	5838952.2	1480412.7	4240121.7	1017736.6
8	1004882.2	331669.4	1879668.1	459451.9
9	2560493.0	659437.8	3313004.3	57487.4
10	331949.1	105297.4	798472.2	252538.0
U.S.	134548492.9	18503963.7	84478344.2	10053970.7

Table 26

Estimated Total Amount and Standard Error of Ounces Used and Stored of 2,4-D + Silvex Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Total	S.E.	Total	S.E.
1	1437066.7	790552.3	2409200.0	1457268.0
2	9174999.0	4303433.7	3701225.8	1753208.6
3	2066062.7	682939.8	1952334.5	656359.0
4	783774.8	307590.6	6012839.7	2237324.4
5	16390471.3	4339007.2	22081987.3	4647302.1
6	3415909.1	1152498.9	6931190.1	1607649.0
7	11531491.3	2182339.8	11339226.1	2855228.7
8	5607601.7	2234697.5	5881252.7	1304574.4
9	6059181.9	1895736.4	5511901.0	1312157.1
10	12356880.5	4275238.8	4258518.3	2158153.5
U.S.	68823439.0	8455101.0	70078675.4	7144884.7

Table 27

Estimated Total Amount and Standard Error of Ounces Used and Stored of Diazinon Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

	Ounces Used		Ounces Stored	
Region	Total	S.E.	Total	S.E.
1	1389516.7	510772.0	1014400.0	397543.7
2	4417592.1	2493543.4	1910310.1	667258.9
3	777142.9	271585.4	1374216.0	444044.4
4	13909078.7	5593618.1	4819630.3	1373880.2
5	7004942.7	2775188.9	5705197.5	1271153.9
6	8993157.0	3644673.3	17588826.4	8439583.4
7	29856547.8	7957157.5	10606160.9	3909349.0
8	4409818.0	2070663.4	1072173.4	264410.0
9	10847890.2	4431952.8	5814860.1	1021965.8
10	2401397.6	529978.9	2096363.3	382033.9
U.S.	84007083.6	12097680.4	52002138.0	9595503.4

Table 28

Estimated Total Amount and Standard Error of Ounces Used and Stored of Baygon + DDVP Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Ounces Used		Ounces Stored	
	Total	S.E.	Total	S.E.
1	5769400.0	2248198.7	961566.7	222519.8
2	29077123.8	7805958.3	3655304.9	989478.3
3	4814494.8	1678682.2	1819651.6	481401.7
4	27221552.6	7324870.4	4258120.0	877678.1
5	9905426.8	3012406.4	6225095.5	2561170.0
6	1180041.3	571868.0	521702.5	290789.1
7	2073209.7	1007110.8	503660.9	155418.9
8	367858.7	179392.2	345428.3	137127.2
9	15519324.0	1934598.6	7368747.0	880246.3
10	254195.3	107243.5	143545.6	58273.8
U.S.	96182625.9	11690223.9	25802822.8	3081555.9

Table 29

Estimated Total Amount and Standard Error of Ounces Used and Stored of Malathion Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Ounced Used		Ounces Stored	
	Total	S.E.	Total	S.E.
1	454366.7	161957.4	1072516.7	287545.3
2	339814.8	117516.5	1965415.2	554730.9
3	417003.5	140585.8	3203344.9	1718198.2
4	11592848.6	4946170.9	8095107.2	2453195.1
5	2298496.8	466223.9	6608178.3	2015567.9
6	4335099.2	1056316.2	7067826.4	2140024.4
7	989752.2	367397.1	1188873.9	467069.1
8	1139464.7	595075.7	1300963.6	291865.1
9	5619402.6	1091267.2	7906255.1	1137573.3
10	864263.9	284471.7	1411531.4	309960.7
U.S.	28050512.8	5255327.2	39820012.8	4438072.3

Table 30

Estimated Total Amount and Standard Error of Ounces Used and Stored of Metaldehyde Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Ounces Used		Ounces Stored	
	Total	S.E.	Total	S.E.
1	243033.3	177026.6	507200.0	266873.9
2	110210.2	110208.4	183683.7	183682.8
3	151637.6	151639.6	682369.3	485202.0
4	1871701.1	1114185.1	1555851.5	690393.6
5	6156687.9	2130900.2	5937783.4	2486851.7
6	3304115.7	2449747.8	2037124.0	1242902.5
7	134700.0	73254.6	404100.0	214067.5
8	179443.3	93189.5	753661.7	312740.8
9	147746310.0	22566199.7	44251573.7	5076689.0
10	9476997.6	2409607.3	4793823.7	1050174.4
U.S.	69374836.7	22954378.9	61107171.0	5963683.3

Table 31

Estimated Total Amount and Standard Error of Ounces Used and Stored of Warfarin Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

	Ounces Used		Ounces Stored	
Region	Total	S.E.	Total	S.E.
1	803066.7	293137.4	121516.7	63071.7
2	3701225.8	1062757.7	1157207.1	363351.7
3	758188.2	376294.3	426480.8	241159.9
4	5626801.4	3793038.9	397736.5	205048.0
5	12313375.8	2985662.6	3844509.6	1120542.1
6	4036983.5	1008020.3	1900487.6	910042.7
7	2155200.0	1347361.8	415813.0	230730.7
8	798522.5	544565.3	605621.0	538802.7
9	1299792.2	379466.5	547280.9	216586.7
10	1390597.6	622240.3	562220.1	280004.5
U.S.	32883753.6	5321421.3	9978873.3	1669986.6

Table 32

Estimated Total Amount and Standard Error of Ounces Used and Stored of Arprocarb Formulations By EPA Region. National Household Pesticide Usage Study, 1976-1977.

	Ounces Used		Ounces Stored	
Region	Total	S.E.	Total	S.E.
1	3444733.3	1277939.8	1590283.3	305398.5
2	7273873.0	2996026.0	3646120.7	639077.3
3	3971010.5	1465735.9	2265087.1	492803.1
4	19828333.3	11863312.4	3743402.2	993056.3
5	6348229.3	1843532.3	5404203.8	1065953.0
6	15675917.4	7409372.9	4471735.5	879018.2
7	1563691.3	338184.0	1376282.6	384278.3
8	309539.6	122227.7	686370.4	197951.4
9	3264139.9	1068281.5	2169578.0	774958.9
10	484466.3	236617.4	161488.8	67082.5
U.S.	62163933.9	14598618.3	25514552.5	2105124.3

Table 33

Estimated Total Amount and Standard Error of Ounces Used and Stored of Formulations Containing a Mixture of Captan, Methoxychlor, Rotenone, and Rotenoids By EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Ounces Used		Ounces Stored	
	Total	S.E.	Total	S.E.
1	1072516.7	272372.6	1114783.3	250321.5
2	1148022.9	408324.5	1184759.6	333293.2
3	843484.3	291317.9	1876515.7	663151.6
4	573208.5	301743.8	678491.6	304002.4
5	14652917.2	2958106.8	5800968.2	1034726.2
6	1689322.3	461712.1	1912909.1	472864.2
7	1446560.9	363778.3	661787.0	163322.2
8	883758.0	226599.9	973479.7	242095.6
9	1993666.3	438496.4	1759117.3	347525.3
10	140555.0	56169.7	454560.9	332170.7
U.S.	24444012.1	3124023.3	16417372.4	1522034.0

Table 34

Estimated Total Amount and Standard Error of Ounces Used and Stored of Formulations Containing a Mixture of Ovex, Lindane, Rotenone, and Folpet By EPA Region. National Household Pesticide Usage Study, 1976-1977.

Region	Ounces Used		Ounces Stored	
	Total	S.E.	Total	S.E.
1	845333.3	206193.1	855900.0	235260.6
2	918418.3	296563.7	1432732.6	766753.4
3	1459512.2	559943.2	805574.9	278501.0
4	1766417.9	458486.0	1707927.2	575402.4
5	5253707.0	1469846.1	3735057.3	861021.2
6	1602371.9	827752.5	794975.2	249018.2
7	778917.4	240897.3	1270865.2	369967.3
8	1659850.1	489744.5	1251616.7	437265.9
9	2247761.0	447998.4	1759117.3	396865.2
10	472504.1	143338.8	391759.8	127891.7
U.S.	17004793.3	2004735.2	14005526.3	1535321.5

Economic Loss Involving Household Pesticide Usage

Household pesticide usage, especially improper or careless usage, can result in economic loss through, for example, destruction of desirable plants, staining of furniture or carpets, injury to pets, or loss of cash crops or other cash products. In order to obtain information on economic losses involving household pesticide usage, interviewed householders were queried regarding both the number of economic losses which the household had experienced as a result of using pesticides in the past 12 months prior to the interview, and the approximate dollar value of each loss. Based on these data, it was estimated that approximately one and a half million households in the United States had experienced annually at least one economic loss as a result of household pesticide usage (Table 35). Thus, the estimated percent of U.S. households which experienced an economic loss was 2.0% with a standard error of .2%. The proportion of households having experienced an economic loss involving household pesticide usage did vary among the 10 EPA regions (Figure 14); however, based on a chi-square test for homogeneity of proportions, this variation was not statistically significant at the 5% level ($p = .056$).

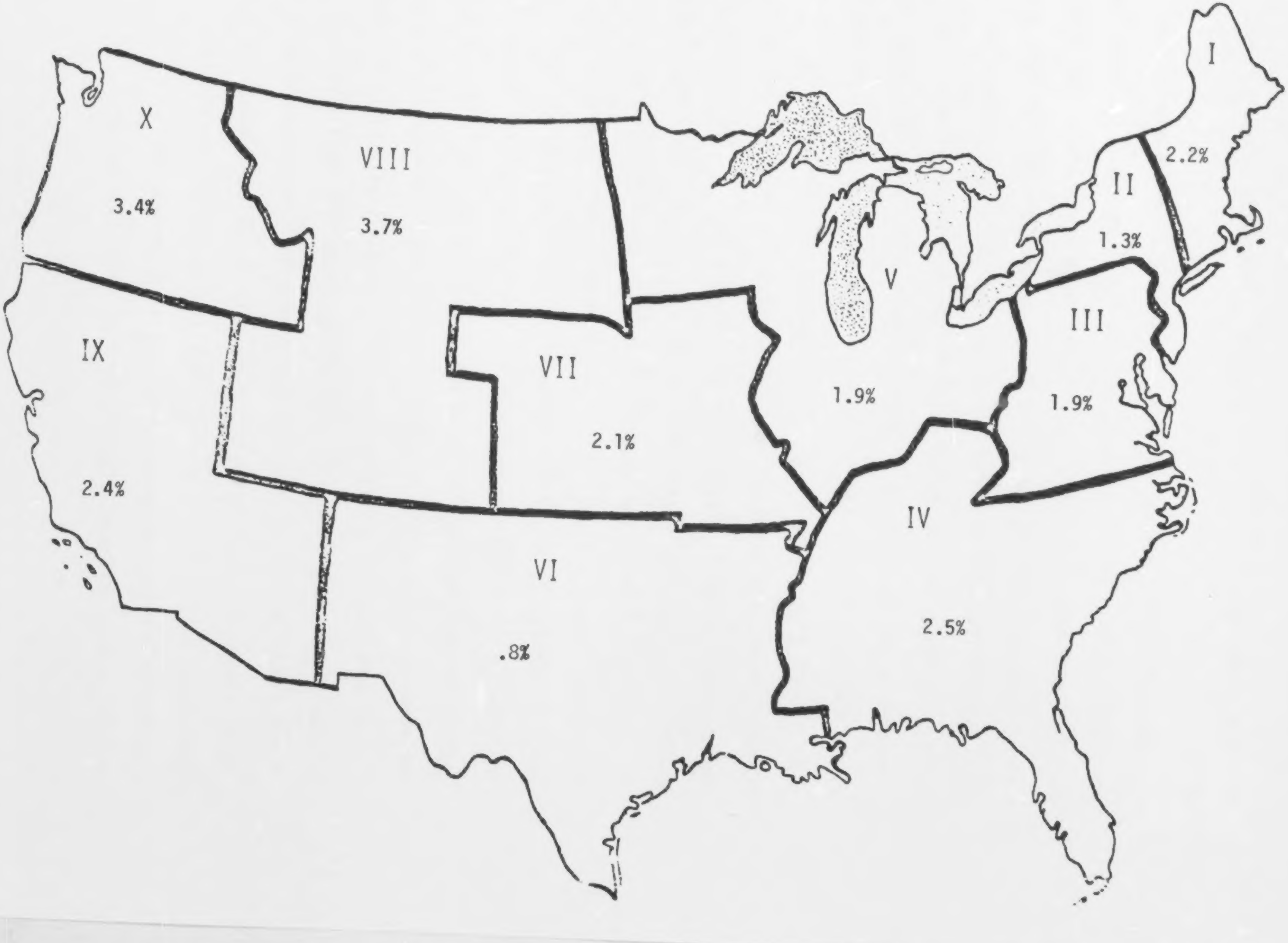
In order to estimate the number of economic losses involving household pesticide usage, it was necessary to assign the value "4" for those few households for which the respondent indicated merely that the household had experienced more than three losses; thus, the estimated total number of economic losses, as presented in Table 35, should be considered a conservative estimate since some of the households, which indicated "greater than three losses", may in fact have experienced five or more economic losses involving household pesticide usage. The mean number of economic losses among those households which had experienced a loss involving household

Table 35

Estimated Total Number of Households which Experienced an Economic Loss and the Estimated Total Number of Economic Losses by EPA Region.
National Household Pesticide Usage Study, 1976-1977.

	Number of Households		Number of Losses	
Region	Total	S.E.	Total	S.E.
1	90373	23094	132546.8	39723.9
2	111465	33414	162130.9	58941.4
3	155853	41282	178117.3	51759.5
4	298442	62861	501925.9	131973.6
5	290395	67319	419459.2	117687.4
6	63471	28289	76165.5	35820.8
7	85614	26814	94175.8	30621.2
8	78037	21267	84040.1	23633.7
9	16438	49090	318961.1	85439.7
10	85564	21740	147977.5	45003.2
U.S.	1475653	129456	2115500.2	226059.8

Figure 14. Estimated percent of households experiencing economic loss involving household pesticide usage. National Household Pesticide Usage Study, 1976-1977.


I
2.2%
II
1.3%
III
1.9%
IV
2.5%
V
1.9%
VI
.8%
VII
2.1%
VIII
3.7%
IX
2.4%
X
3.4%

pesticide usage was estimated to be 1.4 with an estimated standard error of .2.

For each household which had experienced at least one economic loss involving household pesticide usage, the respondent was asked to categorize each loss with respect to approximate dollar value as follows: less than \$100; greater than \$100 but less than \$250; greater than \$250 but less than \$500; greater than \$500 but less than \$1000; or greater than \$1000. In order to estimate the mean dollar value of the experienced losses, it was necessary to use the midpoint of the first four dollar-value intervals and to use the lower limit of the fifth dollar-value category (i.e., greater than \$1000). Thus, as in the case of estimating the total number of economic losses, the estimated mean dollar value of economic losses involving household pesticide usage can be considered a conservative estimate; however, with only four losses reported in the "greater than \$1000" category, the net effect of using the lower limit of \$1000 might well be considered negligible. Based on these data, it was estimated that the mean dollar value of reported losses involving household pesticide usage was \$86.61 with an estimated standard error of \$10.69. Although there appears to be variation in the mean dollar value among the 10 EPA regions (Table 36), this variation was not statistically significant at the 5% level (p = .072).

By combining the estimated number of economic losses involving household pesticide usage (Table 35) with the estimated mean dollar value of such losses (Table 36), it was possible to estimate the total dollar value of losses involving household pesticide usage in the United States. In particular, based on the results of this study, the estimated economic loss involving household pesticide usage in the U.S. is approximately 183 million dollars with an estimated standard error of 30 million dollars.

Table 36. Estimated mean dollar value and standard error of economic losses involving household pesticide usage by EPA region. National Household Pesticide Usage Study, 1976-1977.

Region	$\bar{X}$	S.E.
1	$ 67.86	$ 9.78
2	66.67	11.36
3	50.00	0.00
4	116.91	29.57
5	69.57	14.91
6	50.00	0.00
7	75.00	16.67
8	50.00	0.00
9	88.39	34.06
10	156.58	68.50
U.S.	$ 86.61	$10.69

DISCUSSION

A significant finding of the National Household Pesticide Usage Study is that nine of every ten households in the United States used some type of pesticide in their house, garden, or yard. The percentage of households found in this study to have used some type of pesticide in their house, garden, or yard (i.e., 90.7%) is consistent with results from previous limited studies; that is, 90.7% versus 92.5% from a 1972 study involving 525 households in Philadelphia, Dallas, and Lansing (4), 89.0% from a 1969 study involving 196 households in South Carolina (5), and 71.7% from a 1974 study involving 230 households in Colorado (6).

Over three times as many householders used pesticides in their houses than in their yards. Such widespread use of pesticides in the home environment is undoubtedly a significant source of exposure of the general population to pesticides. The proportions of households using pesticides were found to vary significantly among geographic regions of the United States. As expected from the results of previous limited investigations (4,5, and 6), a significantly larger proportion of southeastern households (EPA Region IV) used pesticides than the northern and mountain area households (EPA Regions I, II, V, VIII, and X).

Furthermore, results of this study indicated that householders living in the southeastern United States also have a greater potential for exposure to termiticides and pesticides used by commercial applicators than those residing in other EPA regions. For example, more than 54% of the southeastern U.S. householders used termiticides and more than 44% contracted their household pesticide work through commercial applicators.

Over 500 different pesticide formulations were found to be used by the 8254 householders in the study. Thus, U.S. householders have multiple opportunities to be exposed to a variety of pesticide formulations in the home environment. A key result of this study is that 15 pesticide formulations accounted for 65.5% of all observed pesticide containers in this national study. Thirteen of the 15 pesticides were insecticides, one was a herbicide (2,4-D & silvex), and one was a rodenticide (warfarin). It is also of interest that four of the leading pesticides were mixtures of different compounds and were designed for a wide spectrum of usage in the household. Many householders either did not know what pesticide they had used (e.g., "bug spray") or equated pesticides with a trade name (e.g., "Raid"). In addition to the aforementioned pesticide formulations, households were found to use moth balls (35.8% of the households), disinfectants (90% of householders), no-pest strips (16.4%), and pet insecticide collars (28%). It is quite possible that household use of pesticides may have a more significant role in human exposure to pesticides than previously thought.

Results of this study indicated that householders used the pesticide label as a primary source of information regarding the usage, storage, and disposal of pesticides. Householders stated that they read the label primarily to obtain information regarding application procedures and preventive measures (49.4% and 34.8%, respectively). Relatively few householders read the label to learn about the pesticide ingredients or antidotes (10.2% and 6.2%, respectively). This finding is an important consideration if the label is to have a role in further reducing pesticide poisonings in humans. It is of considerable concern that only 5.6% of the householders obtained pesticide information from knowledgeable sources such as health department personnel, agriculture extension agents, and pesticide suppliers.

Because of the traditional problems associated with disposal of pesticides, the National Household Pesticide Usage Study included a section of questions regarding the disposal of pesticide wastes. In particular, it was found that the majority of householders completely used their unwanted pesticides. Over two-thirds of the householders discarded empty pesticide containers with other solid waste material generated by the household.

The National Household Pesticide Usage Study was designed to obtain information concerning possible health effects due to pesticide usage in the household. A total of 253 respondents stated that a member of the household had experienced nausea, dizziness, headaches, or vomiting as a result of household pesticide usage. Of these 253, only 22 (<10%) contacted a physician, and seven of the 22 were diagnosed as having experienced a pesticide poisoning. Only one of the seven diagnosed pesticide poisonings was actually hospitalized.

The National Household Pesticide Usage Study was also designed to obtain information regarding economic losses due to household pesticide usage. A total of 142 respondents reported one or more economic losses involving household pesticide usage. Among these households, the mean number of economic losses was 1.2 with an estimated mean dollar value of $86.61 per loss. Whereas the percent of households which experienced at least one economic loss is only 2%, the estimated total dollar value of economic losses involving household pesticide usage in the U.S. was approximately 183 million dollars.

In summary, the major findings of the National Household Pesticide Usage Study are:

(1) a high proportion of households use pesticides;
(2) less than 50% of the respondents read pesticide labels for information regarding application procedures and preventive measures;
(3) many householders are unaware of the formulations in the pesticide products that they use or equate a pesticide with a general trade name;

(4) more exact information is needed regarding health effects of pesticide usage in the home environment;

(5) whereas the proportion of households which experienced an economic loss involving household pesticide usage is relatively small, the total estimated dollar value of such economic loss is considerable;

(6) the use of pesticides in the home environment may be a major source of pesticide exposure in the general population. This is of special significance since certain members of the family spend the majority of their time in the home environment.

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APPENDICES

APPENDIX A

SAMPLE ALLOCATION FOR HOUSEHOLD PESTICIDE USAGE STUDY

SMSAs (7,500)

SMSA	Occupied Housing Units	Population	Sample Size
Midland, Texas	19,804	65,433	121
Pittsfield, Massachusetts	24,899	79,660	135
Billings, Montana	27,641	87,350	142
Green Bay, Wisconsin	43,560	158,244	179
Springfield, Missouri	51,153	152,929	194
Fort Smith, Arkansas	52,589	160,421	197
Salem, Oregon	59,175	186,658	209
Montgomery, Alabama	60,322	201,325	211
Lowell, Massachusetts	60,444	212,859	211
Colorado Springs, Colorado	67,581	235,972	224
Charleston, W. Virginia	74,511	229,515	235
Santa Barbara, California	83,929	264,324	249
Fort Wayne, Indiana	85,720	280,455	252
Columbia, South Carolina	86,202	322,880	254
Albuquerque, N.M.	94,223	315,774	265
York, Pennsylvania	105,004	329,540	280
New Haven, Connecticut	113,001	355,613	290
Richmond, Virginia	163,313	518,319	349
Omaha, Nebraska	165,216	540,142	351
Jersey City, N.J.	207,499	609,266	394
Albany, New York	230,484	721,910	414
San Jose, California	322,782	1,064,714	490
Miami, Florida	428,026	1,267,792	565
Seattle, Washington	473,222	1,421,869	594
Cleveland, Ohio	650,138	2,064,194	695
			7,500

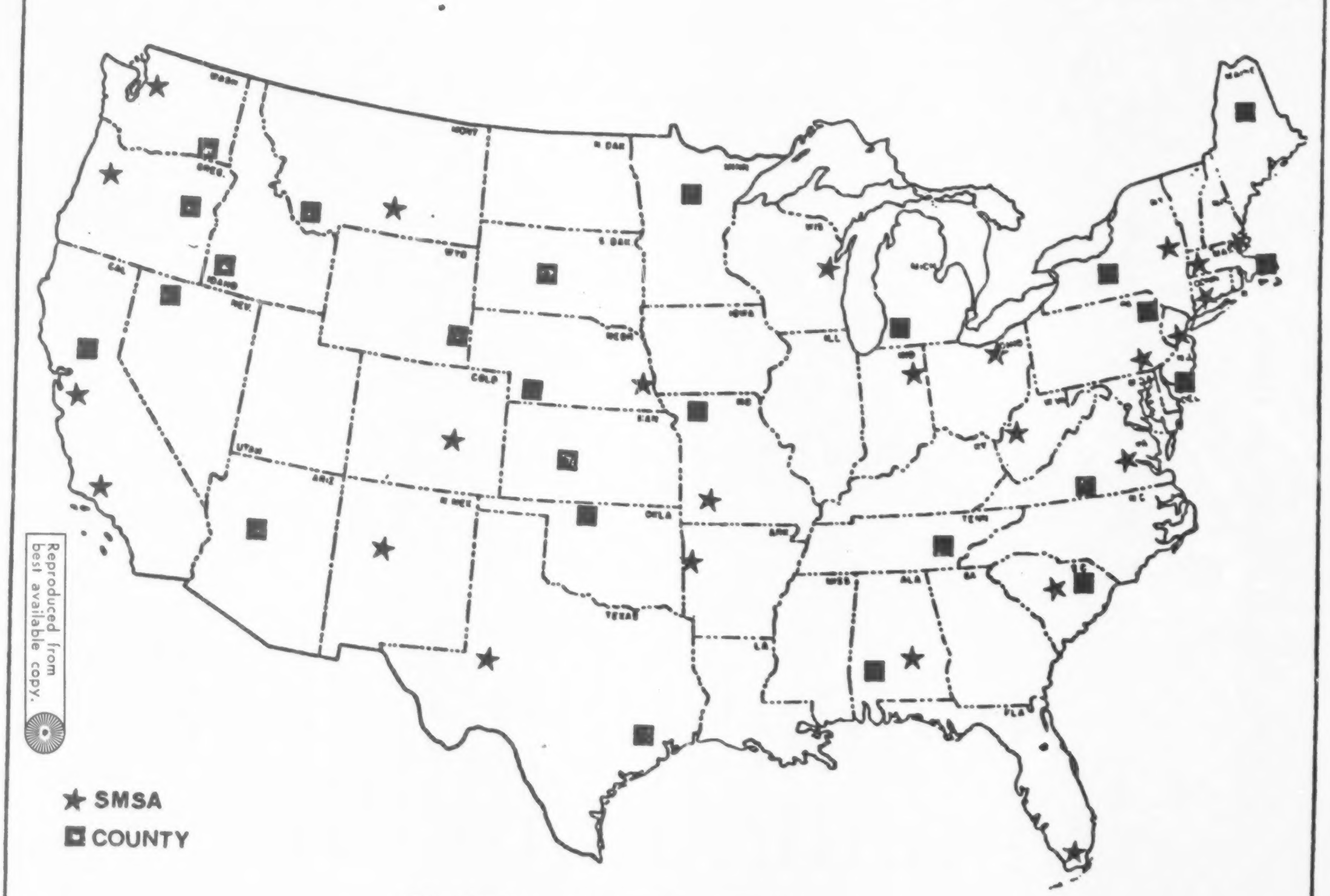
Data from "County and City Data Book - 1972"
Under SMSAs col. 85 and 3
Counties col. 85 and 3

SAMPLE ALLOCATION FOR HOUSEHOLD PESTICIDE USAGE STUDY

COUNTIES (2,500)

County	Occupies Housing Units	Population	Sample Size
Boise, Idaho	578	1,763	29
Sully, South Dakota	703	2,376	33
Hitchcock, Nebraska	1,413	4,044	46
Humboldt, Nevada	2,145	6,503	56
Grant, Oregon	2,360	7,076	58
Beaverhead, Montana	2,683	8,187	64
Alfalfa, Oklahoma	2,724	7,224	64
Greene, Alabama	2,947	10,650	66
Hubbard, Minnesota	3,409	10,583	71
Goshen, Wyoming	3,607	10,885	74
Pike, Pennsylvania	4,130	11,818	79
Grundy, Missouri	4,441	11,819	81
Piscataquis, Maine	5,243	16,285	89
Rhea, Tennessee	5,331	17,202	91
Colorado, Texas	5,768	17,638	94
Marion, South Carolina	8,413	30,270	114
Halifax, Virginia	8,515	30,076	115
Seneca, New York	9,853	35,083	123
Yavapai, Arizona	12,999	36,733	141
Yuba, California	13,074	44,736	141
Walla Walla, Washington	13,438	42,176	144
Saline, Kansas	14,973	46,592	151
Allegan, Michigan	19,494	66,575	172
Cape May, New Jersey	21,177	59,554	180
Barnstable, Massachusetts	32,936	96,656	224
			2,500

Data from"County and City Data Book - 1972"
Under SMSAs col. 85 and 3
Counties col. 85 and 3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SELECTED SAMPLING SITES

APPENDIX B

HOUSEHOLD PESTICIDE USAGE STUDY QUESTIONNAIRE

HOUSEHOLD PESTICIDE USAGE STUDY

(Home and Garden)

Your responses to this questionnaire are protected by the Privacy Act of 1974 (5 U.S.C. 552 a(e)(3)). Once the study is completed and your response has been tabulated, this questionnaire will be destroyed and there will be no way to identify your name or response. Your name and telephone number is requested for the sole purpose of call back for our quality check on the data.

This study is authorized by law (7 U.S.C. 136 r(a)(b)(c)), although you are not required to respond, your cooperation is needed to make the results of this study comprehensive, accurate, and timely.

The purpose of this study is to characterize the Nation's household usage of pesticides including: estimates of kinds and amounts of pesticides used, adequacy of household storage, and frequency and manner of application within the home environment. In addition, we are trying to determine the numbers of persons being poisoned by pesticides within the home.

The data, information and conclusions resulting from this study will be utilized for policy decision-making and will be published and available to other researchers and the general public upon completion of the study.

This list includes the main categories of pesticides, their uses, and examples of specific pesticides in each category.

PESTICIDES

TYPE	USE	PRODUCT
Herbicides	Weed Killer Dandelion Killer Crabgrass Killer Lawn Weed Killer	Weed-B-Gon Scotts 2-4 D
Insecticides	Flying Insect Sprays or vapors House & Garden Insect Spray Rose & Flower Dust Ant & Roach Killers Fly & Mosquito Killers Animal Flea & Louse Killer	Raid Black Flag Shell
Rodenticides	Mice & Rat Killer Gopher & Mole Killer	D-Con Warfarin
Nematocides	Lawn Disease Control Sod Webworm Control Chinch Bug Control	Ortho Scotts
Fungicides	Rose & Garden Fungicide Vegetable Garden Snow Mold Brown Patch Copper Spot	Scotts Ortho
Molluscicides	Slug & Snail Killers	
Wood preservatives	Wood Preservations	Creasote PCP's

Disinfectant definition: A disinfectant is an agent that kills microorganisms such as bacteria, mold and fungi on inanimate objects.
Examples: Pine-Sol, Lysol, Clorox

FORM ID: _ _ _ _ _ _ _ _ _ _ _ _

FORM: P VER: 5 YEAR: 197_ STATE: _ _ COUNTY: _ _ _ HOUSEHOLD: _ _ _ _ CARD: 0 1
1 2 3 4 6 9 13

STATUS: _ 1-Original, Interviewed 1st visit 2-Original, interviewed on call back
15 3-No interview due to refusal; 4-Alternate interview due to vacancy;
5-Interview not obtained on call back

TIME OF INTERVIEW: _ 1-Before 17:00 2-After 17:00
16

INSPECTION: _ 1-Inspected 2-Not Inspected
17

STRATA: 1-SMSA 2-County _18

CLASS: IF A SMSA: 1-Urbanized; 2-Non-urbanized _19
1-Upper; 2-Middle; 3-Lower _20
IF NON-URBANIZED: 1-Urban (2,500 or more); 2-Rural (less than 2,500) _21
IF A COUNTY: 1-Urban; 2-Rural _22

NAME: ______________________ ADDRESS: ______________________

PHONE: Area Code _ _ _ Number _ _ _ - _ _ _ _

WHO IS BEING INTERVIEWED: _ 1-Household Head, Male 2-Household Head, Female
23 3-Other Adult

TIME: _ _ : _ _ COMMUNITY: ______________________

DATE: Month _ _ Day _ _ INTERVIEWER: _ _ Interview Partially Completed _
24 25 26 27 28 29 30

BASIC INFORMATION

Definitions

PESTICIDE: A pesticide is any substance that is used to kill any type of pest. These include the following:

a) Herbicides used to kill unwanted vegetation;
b) Insecticides used to kill flying or crawling insects;
c) Rodenticides used to kill mice, rats, gophers, etc.;
d) Nematocides used to kill unwanted thread or roundworms, etc.;
e) Fungicides used to kill unwanted fungi, mushrooms, and molds;
f) Molluscicides used to kill snails and slugs.

PREMISES: The residence includes basement and attached garages; all lawn or yard areas including ornamental flower gardens, flower beds, bushes or trees; any area used as a garden for the production of vegetables or other edible produce; and all small buildings or sheds in the yard or garden area.

---

1. Has a commercial applicator treated these premises for pests within the past year?
33 _ Yes
34 _ No
35 _ Unknown

2. Has this home ever been treated for termites?
36 _ Yes
37 _ No
38 _ Unknown

3. Within the past 12 months has this household used no-pest strips?
39 _ Yes
40 _ No
41 _ Unknown

4. Within the past 12 months has this household used any of the following pesticides on pets?
42 _ Insecticide Collar 1-Yes 2-No 3-NA
43 _ Insecticide Shampoo 1-Yes 2-No 3-NA
44 _ Insecticide Powder 1-Yes 2-No 3-NA
45 _ Other ______________

5. Within the past 12 months have you or any member of the household used moth balls, crystals, flakes, or aerosols?
47 _ Yes
48 _ No
49 _ Unknown

Form Approved
OMB No. 158-S-76004
Expiration date: 1/31/77

6. Within the past 12 months have pesticides been used in the:

50 __ House 1-Yes 2-No
51 __ Garden 1-Yes 2-No 3-NA
52 __ Yard 1-Yes 2-No 3-NA

7. If pesticides have not been used by the household in the past 12 months, why not?

54 __ No need to
55 __ Afraid to
56 __ Don't believe in use of pesticides
57 __ Other__________________________
58 __ Not Applicable

8. Are any pesticides stored on the premises that haven't been used in the past 12 months?

60 __ Yes
61 __ No
62 __ Unknown

9. Within the past 12 months, have you or any member of the household used any disinfectants?

63 __ Yes
64 __ No
65 __ Unknown

OFFICE USE ONLY:

Number of pesticides on pages 3 and 4 __ __ 66 67

COMMENTS:____

FORM ID _ _ _ _ _ _ _ _ _ _ _ _

What are the names of all pesticides used by the household in the past 12 months and the names of all non-used pesticides currently stored on the premises?	CARD (Office Use Only)	PESTICIDE CODE (Office Use Only)	Who used this specific pesticide?	Is this pesticide in liquid or solid form? (Aerosols are liquids)	How many ounces of this pesticide have you or any member of your household used in the past 12 months?	How many ounces of this pesticide are currently stored on the premises?	Where on the premises has this pesticide been used in the past 12 months?	What type of pests has this pesticide been used for in the past 12 months?	How many times has this pesticide been used in the past 12 months?	Do you or any member of the household read the pesticide label?	Is the print on the label large enough to read?	Is the label understandable by those who use the pesticide?	Are all the labels on stored original containers still intact and legible?	What type of precautions are taken when using this pesticide?	Is this pesticide stored under lock and key?	Is this pesticide stored in its original container?	Where on the premises is this pesticide stored?	How many feet off the floor is this pesticide stored?
PESTICIDE NAME			COMMERCIAL HOUSEHOLD HEAD - MALE HOUSEHOLD HEAD - FEMALE OTHER ADULT->18 yrs old CHILD-<18 yrs old	LIQUID SOLID			HOUSE GARAGE LAWN YARD(other than lawn) VEGETABLE GARDEN FLOWER BED OTHER	INSECTS WEEDS RODENTS FUNGI SNAILS & SLUGS OTHER		YES NO	YES NO	YES NO	YES NO	BOOTS GLOVES MASK WASH HANDS AREA OFF-LIMITS TO CHILDREN & PETS OTHER NONE	YES NO NOT STORED	YES NO NOT STORED	KITCHEN-UNDER SINK KITCHEN-OTHER UTILITY ROOM GARAGE SHED BACK PORCH BASEMENT OTHER NOT STORED	
	13	15	22	27	29	32	35	42	48	50	52	54	56	58	65	68	71	80

FORM ID ----------

What are the names of all pesticides used by the household in the past 12 months and the names of all non-used pesticides currently stored on the premises?

PESTICIDE NAME

13	CARD (Office Use Only)	
15	PESTICIDE CODE (Office Use Only)	
22	COMMERCIAL HOUSEHOLD HEAD - MALE HOUSEHOLD HEAD - FEMALE OTHER ADULT->18 yrs old CHILD-<18 yrs old	Who used this specific pesticide?
27	LIQUID SOLID	Is this pesticide in liquid or solid form? (Aerosols are liquids)
29		How many ounces of this pesticide have you or any member of your household used in the past 12 months?
32		How many ounces of this pesticide are currently stored on the premises?
35	HOUSE GARAGE LAWN YARD(other than lawn) VEGETABLE GARDEN FLOWER BED OTHER	Where on the premises has this pesticide been used in the past 12 months?
~2	INSECTS WEEDS RODENTS FUNGI SNAILS & SLUGS OTHER	What type of pests has this pesticide been used for in the past 12 months?
48		How many times has this pesticide been used in the past 12 months?
50	YES NO	Do you or any member of the household read the pesticide label?
52	YES NO	Is the print on the label large enough to read?
54	YES NO	Is the label understandable by those who use the pesticide?
56	YES NO	Are all the labels on stored original containers still intact and legible?
58	BOOTS GLOVES MASK WASH HANDS AREA OFF-LIMITS TO CHILDREN & PETS OTHER NONE	What type of precautions are taken when using this pesticide?
65	YES NO NOT STORED	Is this pesticide stored under lock and key?
68	YES NO NOT STORED	Is this pesticide stored in its original container?
71	KITCHEN-UNDER SINK KITCHEN-OTHER UTILITY ROOM GARAGE SHED BACK PORCH BASEMENT OTHER NOT STORED	Where on the premises is this pesticide stored?
80		How many feet off the floor is this pesticide stored?

10. At which locations do you or any member of the household buy your pesticides that have been used in the past 12 months?

18 __ Grocery Store
19 __ Hardware Store
20 __ Discount Store
21 __ None
22 __ Drug Store
23 __ Feed Store
24 __ Sales Person other than Retail Store
25 __ Other ____________________________
26 __ Nursery
27 __ Unknown

11. What information do you or members of the household obtain from reading the label?

28 __ Ingredients
29 __ Preparation
30 __ Applications
31 __ Precautionary measures
32 __ Antidotes
33 __ Other ____________________________

12. Do you or any member of the household have any suggestions for improving pesticide labels in any way? ____________________________

____

____

____ 34-35__

13. Where do you and/or members of the household learn how to use, store, or dispose of pesticides?

36 __ Neighbor, friend or relative
37 __ Agriculture Extension Service
38 __ Other ____________________________
39 __ Mass media
40 __ Sales person
41 __ Health Department
42 __ None
43 __ Label

14. How do you or any member of the household dispose of unwanted pesticides?

44 __ Street gutter
45 __ Sink or toilet
46 __ Given away
47 __ Other ____________________________
48 __ Refuse
49 __ Burned
50 __ Unknown
51 __ Buried
52 __ Poured on ground
53 __ Used up
54 __ Not applicable

15. How do you or any member of your household dispose of unused pesticides that have been diluted for use?

55 __ Street gutter
56 __ Sink or toilet
57 __ Given away
58 __ Other ____________________________
59 __ Refuse
60 __ Burned
61 __ Unknown
62 __ Buried
63 __ Poured on ground
64 __ Used up
65 __ Not applicable

16. How do you or members of the household dispose of empty pesticide containers?

66 __ Refuse
67 __ Other ____________________________
68 __ Burned
69 __ Buried
70 __ Not applicable

17. Do you or members of the household use empty pesticide containers for other substances?

71 __ No
72 __ Not applicable
73 __ Other pesticides
74 __ Other substances

18. Do you or members of the household use pesticide application equipment for other substances?

75 __ No
76 __ Not applicable
77 __ Other pesticides
78 __ Other substances

Household Pesticide Usage

FORM ID: _ _ _ _ _ _ _ _ _ _ _ _ _ CARD 03/13 Page 6

19. Within the past year have you or any member of your household experienced a pesticide poisoning which was diagnosed by a physician?
18 __ Yes 19 __ No

20. Within the past year have you or any member of your household experienced headaches, nausea, dizziness, fainting or other symptoms following exposure to a pesticide?
21 __ Yes 22 __ No

21. If yes to question 20, was the person treated by a physician?
24 __ Yes 25 __ No 26 __ Not applicable

22. If yes to question 19 or 20 was the person hospitalized?
27 __ Yes 28 __ No 29 __ Not applicable

23. What was the diagnosis?____
____
____

HOUSEHOLD DATA

24. What is the date of birth of Head of Household:______________38_ _/_ _/_ _

25. What was the education level achieved by Household Head?
(Write in the number of years)______________ 44_ _

NOTE: If person being interviewed is Household Head skip questions 26 and 27.

26. What is the date of birth of person being interviewed: ________46_ _/_ _/_ _

27. What was the education level achieved by person being interviewed?
(Write in the number of years)______________ 52_ _

28. What is the occupation of Head of Household:________________________
____ 54_ _

29. How many years has the Household Head lived in this community?
(SMSA or County)?________________________________ 56_ _

30. Where did the Household Head live prior to moving to this city or county?
________________ 58_ _
State
________________ 60_ _
Country

31. How many people in the household are in each of the following age groups?
63 __ 0 - 4 years
64 __ 5 - 9 years
65 __ 10 - 14 years
66 __ 15 - 19 years
67 __ 20 - 24 years
68 __ 25 - 34 years
69 __ 35 - 44 years
70 __ 45 - 54 years
71 __ 55 - 64 years
72 __ 65 +
73 __ Unknown

32. In what type of residence do the householders currently live?
A. 1. Single family 2. Residential double 3. Multiple family
B. 1. Rent residence 2. Own residence 3. Public housing
74_ _

33. What is the size of the premises?
1. Less than ½ acre 2. Greater than ½ acre 3. Unknown 76___

34. Interviewer determine race of Household Head.
1. White 4. American Indian 6. Oriental
2. Mexican American 5. Puerto Rican 7. Negro
3. Other______________________________ 77___

	INSECTS													**RODENTS**					**PLANTS**					**ALL OTHER**
	Centipedes Millipedes Spiders	Ants Termites	Cockroaches	Houseflies Mosquitos & Gnats	Pantry pests (i.e., meal worms)	Bees Wasps	Grasshoppers Crickets	Beetles	Leafminers Scale, Aphids	Ticks, fleas	Moths Butterflies	Other	None	Rats Mice	Moles, Gophers & Shrews	Squirrels	Other	None	Broadleaf weeds	Crabgrass	Poisonous plants	Other	None	
Does this household have problems with any of these pests? Check as many as applicable.																								
Which of the following is the household's most severe pest problem? Select only one.																								
What pesticide(s) has the household used on the following pests? (Write in name of pesticide for each pest treated.) Approximate number of square feet treated?																								
What was the cost of applying each of the aforementioned pesticides?																								
To which of the following pests have you or any member of your household applied the most pesticide during the last year? (Select one and indicate number of applications.)																								
Of those pest problems in your household treated with pesticide, which were successfully treated? (Check as many as appropriate.)																								

Why do you or a member of your household regard the aforementioned pests as problems?

15 __ Destroy property
16 __ Threat to personal health
17 __ They are unsightly (aesthetically undesirable)
18 __ They are a nuisance and annoying can cause minor physical discomfort.
19 __ Other ________________

Has any member of this household had any problems as a result of using pesticides during the past 12 months? (i.e., injury to pets, destruction of desirable plants, staining of rugs or furniture, loss of cash crop or other cash product)

20 __ Yes
21 __ No
22 __ Unknown

9. How many losses has this household experienced in the past 12 months? (Circle correct choice.)

23 __ 1. 1-loss; 2. 2-losses; 3. 3-losses; 4. Greater than 3-losses; 5. Not applicable; 6. Unknown

10. What was the approximate value of each loss?

25 __ 1st loss
26 __ 2nd loss
27 __ 3rd loss

1. Not applicable (No losses)
2. Less than $100
3. Greater than $100 but less than $250
4. Greater than $250 but less than $500
5. Greater than $500 but less than $1000
6. Greater than $1000

FORM ID _ _ _ _ _ _ _ _ _ _ _ _ _

PART II

Household Pesticide Usage Study

Human Pesticide Poisoning Data Sheet

Age at poisoning? _____ Sex ____ Date of occurrence ________________

Place of occurrence ______________________________
City State

Was previous occupation related to pesticides? __________________________

What were the circumstances of exposure? ______________________________

____

____

What was the causative agent? ___________________________________

What was the trade name? _______________________ Carrier_____________

What was the formulation? Dust Wettable Powder Granular Liquid

Other ________________

What was the active ingredient? _________________________________

What application equipment was used? ____________________________

Was any protective clothing in use? _____________________________

What was the date and time of exposure? __________________________

What was the duration of exposure? ______________________________

What were the route(s) of exposure? Dermal Respiratory Oral

Was perspiration present? Yes__ No__

What were the weather conditions? _______________________________

What symptoms developed? ____

____

Hospital ____ Phone ___________

Attending Physician ______________________________ Phone ___________

Treatment ____

TRAINING MANUAL FOR HOUSEHOLD PESTICIDE USAGE STUDY QUESTIONNAIRE

Page 1

TRAINING SESSION - QUESTIONNAIRE

The questionnaire form is designed to be transferred directly to computer data cards for analysis. As such, it is very important that all information be obtained, and recorded on the form. The study depends on the quality of information obtained. The questionnaire is divided into three major areas: 1. Header Information, 2. Basic Information, and 3. Household Data. The front page of the questionnaire is a tear-away page and provides the interviewee with the purpose of this study, rights to privacy, and examples of the different types of pesticides. This page should be given to each interviewee at the beginning of the interview.

The study questionnaire consists of 9 sheets. The first sheet is a tear-away sheet that was previously discussed. Pages 1 through 8 consist of questions to be completed by the field interviewer. You will note that the back of page 6 of the questionnaire is to be completed only in case a pesticide poisoning has been experienced by a household member. Instructions for completion of the questionnaire follow.

Specific Header Information

Page 1 of Questionnaire

I. FORM ID: _ _ _ _ _ _ _ _ _ _ _ _ (DO NOT FILL IN)

II. FORM: (fill in as follows)

Year: (blank 3) - Insert 6 (1976)
State: (blank 4 and 5) - Insert 2-digit state code (provided)
County: (blank 6,7,8) - Insert 3-digit county code (provided)
Household: (blank 9 - 12) - Insert 4-digit code as follows:

1. 1st digit - tract code (insert letter) (refer to Route Itinerary)
2. 2nd digit - block code (insert letter) (refer to Route Itinerary)
3. 3rd & 4th digits - household code within tract and block (insert consecutive interview number, i.e.: 1st house-01; 2nd house-02; etc.)

III. Status:

A. Circle 1,2,3,4, or 5. (Don't insert anything in column 15)

1. Circle 1 if house was original selection scheme and was interviewed on 1st visit.
2. Circle 2 if house was original selection scheme and was interviewed on a call back.
3. Circle 3 if no interview was obtained due to refusal.

4. Circle 4 if alternate house was chosen due to a vacancy at original house selected.
5. Circle 5 if no one was home on call back and interview was not obtained.

IV. Time of Interview:

Circle 1 or 2 (Don't insert anything in column 16).
A. Circle 1 if the interview was held before 17:00 (5:00 PM).
B. Circle 2 if the interview was held after 17:00 (5:00 PM).

V. Inspection: Actually viewing the household pesticides and their storage sites.

A. If inspected, circle 1. If not inspected, circle 2.
B. At all households, an attempt should be made to see the pesticides.
NOTE: Don't insert anything in column 17.

VI. Strata: Information obtained from Route Itinerary

A. If an SMSA, circle No. 1.
B. If county, circle No. 2.
C. Don't insert the number in column 18.

VII. Class: Information obtained from Route Itinerary

A. Column 19 - if a SMSA, circle 1 or 2, depending if the household is in an urbanized or non-urbanized area as indicated on Route Itinerary. (Don't insert number.)
B. Column 20 - if a SMSA, circle 1,2, or 3 depending upon which socioeconomic class the household is in as indicated on the Route Itinerary. (Don't insert number in column.)
C. Column 21 - if the household is in the non-urbanized portion of a SMSA, circle 1 or 2 depending if in an urban or rural area. (Don't insert number in column code space.)

VIII. Write in name, address, and phone number of household interviewed.

A. Ask for address at beginning of interview.
B. Ask for name and phone number at end of interview.
C. Assure that names and addresses will be held in confidence.

IX. Who is being interviewed?

Circle 1,2, or 3. (Don't insert anything in column 23.)
A. Circle 1 if interviewing a male household head.
B. Circle 2 if interviewing a female household head (includes wives).
C. Circle 3 (other adult) if interviewing anyone over 18 years that is not a household head, such as grandparents and children over 18 years still living at home.

X. Time and Community:

A. Insert time on basis of 24 hour clock (example: 2:00 PM = 14:00 hr
B. If SMSA, write in name of SMSA.
C. If county, write in name of place if in an incorporated or unincorporated place, or write in Remainder of ________ Division if in rural area of a certain census subdivision.

XI. Date and Interviewer:

A. Columns 24 and 25 - insert the number of the month (example - July = 0 7.
B. Columns 26 and 27 - insert day of month.
C. Column 28 - insert Center or Project code number.
D. Column 29 - insert interviewer code number.

Basic Information

* - Read pesticide and premises definitions at each household.

NOTE: All questions except 2 refer to usage in the past 12 months.

1. Has a commerical applicator treated these premises for pests within the past year?

33 ___ Yes
34 ___ No
35 ___ Unknown

1. Mark with X.
2. If yes, this means that pesticides are used on the premises in 6.
3. Mark Unknown if interviewee does not know if premises have been treated by a commerical applicator.

2. To the best of your knowledge, has this home ever been treated for termites:

36 ___ Yes
37 ___ No
38 ___ Unknown

1. Mark with X.
2. If yes, pesticides are used in question 6.
3. Mark Unknown if interviewee does not know if the premises have ever been treated.

3. Within the past 12 months, has this household used No-Pest Strips?

39 ___ yes
40 ___ No
41 ___ Unknown

1. This refers to the use of insecticide-treated strips such as Shell No-Pest Strips and excludes sticky fly paper.
2. If yes, this means that pesticides are used on the premises in 6.

4. Within the past 12 months, has this household used any of the following pesticides on pets?

42 ___	Insecticide Collar	1-Yes	2-No	3-NA
43 ___	Insecticide Shampoo	1-Yes	2-No	3-NA
44 ___	Insecticide Powder	1-Yes	2-No	3-NA
45 ___	Other ______________________________			

   1. Circle either 1,2, or 3 for 42,43, or 44.
   2. Don't insert the numbers into the coding spaces.
   3. Leave blank if no response.
   4. Pets include dogs, cats, birds, and horses.
   5. NA=Not applicable, is to be used if the household doesn't have any pets.
   6. If Other is used, please specify on the line provided.
   7. Horses generally are treated with spray, powder, or a rub-on type of insecticide.
   8. NOTE: Doesn't include repellants.
   9. If yes, this means that pesticides are used on the premises in 6.

5. Within the past 12 months, have you or any member of the household used moth balls, crystals, flakes, or aerosols?

47 ___ Yes
48 ___ No
49 ___ Unknown

   1. Refers to use in the past 12 months.
   2. If yes, pesticides are used on premises in question 6.

6. Within the past 12 months, have pesticides been used in the:

50 ___	House	1-Yes	2-No	
51 ___	Garden	1-Yes	2-No	3-NA
52 ___	Yard	1-Yes	2-No	3-NA

   1. Circle either 1,2, or 3 for 50, 51, or 52.
   2. Don't insert the numbers into the coding spaces.
   3. A blank will signify no response.
   4. Code number 3 (not applicable) is to be used if the home doesn't have a yard or garden.
   5. A garden is a plot of ground used for the production of edible produce.
   6. A flower garden or flower bed, and any ornamental trees or bushes would be included in the category of yard.
   7. Mixed beds or gardens of both flowers and edible produce would require both the yard and garden categories to be indicated.
   8. An enclosed patio attached to the house is considered part of the house. Otherwise, a patio is considered as part of the yard.
   9. The foundation is to be considered part of the house.
   10. A 1 is to be circled if the household employs a commercial applicator, uses termite control, uses no-pest strips, uses a pesticide on their pets, or moth balls, crystals, flakes or aerosols.

11. If a pet on which insecticides are used is primarily an indoor animal, mark category for house, if primarily an outdoor animal, mark category for yard.

7. If pesticides have not been used by the household in the past 12 months, why not?

54 ___ No need to
55 ___ Afraid to
56 ___ Don't believe in use of pesticides
57 ___ Other ____________________________
58 ___ Not applicable

1. Mark (X) any or all applicable.
2. If Other is marked, write in explanation
3. Not applicable is to be marked if 50, 51, and 52 are marked with a 1 or a 3.

8. Are any pesticides stored on the premises that haven't been used in the past 12 months?

60 ___ Yes
61 ___ No
62 ___ Unknown

1. This question is designed to simply determine if the household is still storing any pesticides that it no longer uses, or is storing up pesticides that it hasn't used up to this time.
2. The purpose of this question is to separate current pesticide usage from those pesticides that are no longer in use or haven't been used, but are stored on the premises.

9. Within the past 12 months, have you or any member of your household used any disinfectants?

63 ___ Yes
64 ___ No
65 ___ Unknown

1. A disinfectant includes anything that is a means for destroying molds, bacteria, viruses, fungi, etc.
2. Common examples of disinfectants used in the home are such things as Lysol, Pine-Sol, Chlorox, and ammonia cleaners.
3. This question has no relation to pesticide usage and has no effect on question 6.
4. Mark with X.

Comments:

Use this section for:

1. Recording why no one was at home in a not-at-home from information obtained from alternate.
2. Recording at what point a questionnaire was terminated prematurely due to unforeseen circumstances.

3. Recording if you believe that an interviewee was purposefully giving false information.

Directions for Proceeding with Questionnaire

1. If all negative answers are obtained on page 1 and 2, then proceed directly to and complete page 6.
2. If the household employs a commercial applicator and is knowledgeable in the details of the pesticides used, then complete pages 3,4,5, and 6. If the interviewee is unaware of what pesticide is used, how much, etc., then proceed to page 6.
3. If the interviewee has had their home treated for termites, but uses no other pesticides, proceed to page 6.
4. A. If a household used pest-strips and no other pesticides, page 5 and 6 of the questionnaire should be completed.
   B. If only pet insecticides or moth balls or crystals are used by the household, go directly to page 6.
5. If other pesticides besides those mentioned above are used, such as insect sprays, powders, or herbicides, then page 3 (page 4 if required) should be completed in addition to pages 5 and 6.
6. Question 9 on disinfectants is not to be considered as household pesticide usage, and the response obtained is immaterial in as far as which pages of the questionnaire to complete.
7. The question concerning pesticide storage: (#8)
   A. If the answer is yes, pages 3,4,5, and 6 should be completed.
   B. If the answer is no, page 6 should be completed (if no other pesticides are used.)

Pages 3 and 4 of Questionnaire

NOTE: It is recommended that information on pages 3 and 4 be recorded a column at a time. Example: Record all pesticides used first, and secondly, who uses them.

A. Pesticide Names

What are the names of all pesticides used by the household in the past 12 months and the names of all non-used pesticides currently stored on the premises?

1. If the pesticide used is a common one and a nation-wide brand, all that need be written down is the brand name of the product.
2. If the pesticide used is an uncommon one or a local brand, you must try and get the brand name, active ingredient, and E.P.A. registration number.
3. Ask to see the pesticides if the interviewee is cooperative.
4. If pesticides are seen, please record brand name, active ingredient(s, and E.P.A. registration number.

B. Card

Don't insert anything into this column (OFFICE USE ONLY).

C. Pesticide Code - OFFICE USE ONLY

Disregard this column since the pesticide will be given codes at the Center in Fort Collins.

D. Who uses this specific pesticide?

__ Commercial
__ Household Head - Male
__ Household Head - Female
__ Other Adult (18 years or over)
__ Child (less than 18 years of age)

1. Mark (X) as many as applicable.
2. Household Head - Male is to be marked if a male household head uses the produce.
3. Household Head - Female is to be marked if a female household head uses the pesticide - includes wives.
4. Other Adult would include grandparents, in-laws, etc., living in the household. Also includes children over 18 still living in household.
5. If a commercial applicator is employed, and the interviewee is knowledgeable in its name, how much is used, etc., then this can be filled in. In most cases, however, the interviewee will not know what commercial pesticide was applied on the premises, and he should not complete page 3 (and 4) of the questionnaire. (If commercial pesticide is the only pesticide used.)

E. Liquid or Solid: Is this pesticide in liquid or solid form?
1. Mark (X) whichever applicable. The applicable form is the form (liquid or solid) in which it was purchased.
2. A powder is considered as a solid.
3. An aerosol is considered a liquid.

F. Amount Used: How many ounces of this pesticide have you or any member of your household used in the past 12 months?
1. Relates to amount used in past 12 months.
2. Record in ounces to the nearest ounce (3 spaces).
3. Lbs. x 16 = ounces.
4. If none were used in past 12 months, record 0 (zero).

G. Amount on Hand: How many ounces of this pesticide are currently stored on the premises?
1. Amount stored on premises.
2. Record in ounces to the nearest ounce (3 spaces).
3. If a pesticide hasn't been used in the past 12 months, or is yet to be used, record amount on hand.
4. Lbs. x 16 = ounces.

NOTE: On questions where Other is marked, please specify in blank space above coding area.

H. Where Used: Where on the premises has this pesticide been used in the past 12 months?

__ House __ Yard __ Garage __ Lawn __ Vegetable Garden
__ Flower Beds __ Other______________________

1. Mark (X) any or all applicable.
2. Specify Other is marked.
3. Garage may or may not be attached to the house.
4. Flower boxes are included in Flower Beds.
5. Ornamental trees and bushes are to be included in Yard.

I. Used For: What type of pests has this pesticide been used for in the past 12 months?

__ Insects __ Weeds __ Rodents __ Fungi __ Snails & Slugs

__ Other________________________

1. Mark (X) any or all applicable.
2. Specify Other if marked.
3. Insects include all crawling and flying insects such as flies, mosquitoes, spiders, mites, cockroaches, etc.
4. Weeds are any unwanted vegetation.
5. Rodents are rats, mice, moles, shrews, squirrels, and gophers.
6. Fungi include molds and mildews found, for example, in the bathroom and basement.

J. How Many Times has this pesticide been used in the past 12 months?
1. Insert number of times used in past 12 months.
2. If not used, insert 0 (zero).

K. Do you or any member of the household read the pesticide label? __Yes __Nc
A. If just the name is read and nothing else, then No should be marked.

L. Is the print on the label large enough to read? __Yes __No
A. This question refers only to size of print and not content of the label.
B. If any part of the label can't be read due to smallness of print, then No should be marked.

M. Is the label understandable by those who use the pesticide? __Yes __No
A. This question refers to the technicality of the label or any part of the label.
B. If the interviewee thinks that any part of the label is too technical to be understood, then No should be marked.

N. Are all labels on stored original containers still intact and legible? __Yes __N
A. If label has been removed, torn, or obliterated partially or totally by any means, then mark No.

O. Protection: What types of precautions are taken when using this pesticide?

__Mask __Boots __Wash Hands __Other____________________

__None __Gloves __Area off limits to children and pets

1. Mark (X) any or all applicable.
2. Specify Other if marked.
3. Pause between asking question and giving answer alternatives. Leave Wash Hands as last choice. Give alternatives slowly. This will allow the interviewee to give his own reply and reduce the number of false positives.
4. Don't lead the interviewee.

P. Lock: Is this pesticide stored under lock and key? __Yes __No __Not Store
1. Mark (X) Not Stored if the pesticide has been used in the last 12 months, but either is not stored on premises or is used up by the time of the interview.

Q. Is this pesticide stored in its original container? __Yes __No __Not Stored
1. Mark with X.
2. Mark Not Stored if pesticide has been used up.

R. Storage Room: Where on the premises is this pesticide stored?
__Kitchen-under sink __Kitchen-Other __Utility Room __Garage
__Shed __Back Porch __Basement __Other____________ __Not Stored

1. Mark (X) any or all applicable.
2. Mark (X) Not Stored if the pesticide has been used in the last 12 months, but either is not stored on premises or is used up by the time of the interview.

S. Height Stored (in feet): How many feet off the floor is this pesticide stored?
1. To the nearest foot, how far from the floor is the pesticide stored, and write it in the space.

Page 5 of Questionnaire

10. At which locations do you or any member of the household buy your pesticides that have been used in the past 12 months?
18__Grocery Store
19__Hardware Store
20__Discount Store
21__None
22__Drug Store
23__Feed Store
24__Sales Person Other than Retail Store
25__Other______________________________
26__Nursery
27__Unknown

1. Mark the 1^o location with ⓧ.
2. Mark all other locations with X.
3. Specify Other if marked.
4. Discount Stores include stores like K-Mart, Alco, Gibsons, etc.
5. 24 implies door-to-door sales such as Amway, Fuller Brush, etc.

11. What information do you or members of the household obtain from reading the label?
28__Ingredients
29__Preparation
30__Applications
31__Precautionary measures
32__Antidotes
33__Other______________

1. Mark the 1^o part of label read with ⓧ.
2. Mark remaining parts with X.
3. Preparation means the directions on how to mix up the pesticide or dilute it with water.
4. Application refers to its uses against specific pests.
5. Pause after stating the question. Let them answer it in their own words.
6. The question is designed to determine what the interviewee learns when reading the label.

12. Do you or any member of the household have any suggestions for improving pesticide labels in any way?____
____ 34-35__

26. What is the date of birth of person being interviewed?____46_ _/_ _/_ _

27. What was the education level achieved by person being interviewed?
(Write in number of years) ____________________________ 52_ _

28. What is the occupation of head of household?____________________ 54_ _
1. Write in present occupation (be as specific as possible).
2. Retired is considered an occupation.
3. Unemployed is considered an occupation.

29. How many years has the household head lived in this community (SMSA or county)?_______________ 56_ _
1. Write in number of years to the closest year.
2. Write on line - not in code space.

30. Where did the household head live prior to this city or county?
State____________________
58_ _
Country____________________
60_ _
1. Write in the name of the state and country on the lines provided.

31. How many people in the household are in each of the following age groups?
63__0 - 4 years
64__5 - 9 years
65__10 - 14 years
66__15 - 19 years
67__20 - 24 years
68__25 - 34 years
69__35 - 44 years
70__45 - 54 years
71__55 - 64 years
72__65 + years
73__Unknown

1. Includes all members of the household living in the home, such as grandparents, mother-in-law, etc.
2. Insert the number of people in each age bracket.

32. In what type of residence do the householders currently live?
A. 1. Single Family 2. Residential Double 3. Multiple Family

B. 1. Rent Residence 2. Own Residence 3. Public Housing
74_ _

1. This question has 2 parts - A and B.
2. Circle one choice for both A and B.
3. Residential Double = duplex.
4. Multiple Family = apartment house.
5. Public Housing = any housing that is financed and supported by federal, state, or local government agencies.
6. Don't insert anything in coding spaces (74_ _).

33. What is the size of the premises?
1. Less than ½ acre 2. Greater than ½ acre 3. Unknown
76__

1. The person being interviewed (interviewee) is to answer this question after being given the alternatives. If he/she doesn't know the size of the premises, then Unknown is to be circled. The interviewer is not to guess at the size of the premises. If the interviewee doesn't know, then Unknown must be circled.

2. Don't insert numbers into coding spaces.

34. Interviewer determine race of household head.

1. White
2. Mexican American
3. Other________________________________
4. American Indian
5. Puerto Rican
6. Oriental
7. Negro

77__

1. In most cases, this can be accomplished without asking.
2. If in doubt, read the list of possible races to the respondent and allow him/her to select the correct race.

36. Has any member of this household had any problems as a result of using pesticides during the past 12 months? (i.e., injury to pets, destruction of desirable plants, staining of rugs or furniture, loss of cash crop or other cash product)
    20 __ Yes
    21 __ No
    22 __ Unknown

    1. The examples must be read to the interviewee to insure it is understood that "problems" means other than health problems.
    2. Place an X in the blank of one choice.

37. How many losses has this household experienced in the past 12 months? (Circle correct choice)
    23 __ 1. 1 loss, 2. 2 losses, 3. 3 losses, 4. greater than 3 losses, 5. Not applicable, 6. Unknown

    1. Refers to losses indicated in question 36.
    2. If question 36 is considered "no", circle number 5.
    3. If greater than 3 losses, circle number 4 and indicate number of losses in comments section or on blank area below question 38.

38. What was the approximate value of each loss?

25 __ 1st loss	1. Not applicable (no losses)
26 __ 2nd loss	2. Less than $100.00
27 __ 3rd loss	3. Greater than $100.00, but less than $250.00
	4. Greater than $250.00, but less than $500.00
	5. Greater than $500.00, but less than $1000.00
	6. Greater than $1000.00

    1. Refers to losses indicated in questions 36 and 37.
    2. If no losses, circle 1.
    3. If one loss, place number corresponding to value of loss in blank 25.
    4. If two losses, place number corresponding to value of 1st loss in blank 25 and number corresponding to value of 2nd loss in blank 26.
    5. Follow similar pattern if three losses have occurred.
    6. If greater than three losses, additional information can be included in the comments section or the blank area at the bottom of page 7.

Page 8 is similar to pages 3 and 4 and obtains information requested to be added after the field trials of the questionnaire, so it appears out of context.

1. Does this household have problems with any of these pests? Check as many as applicable.

    1. Indicate by an X in the column under each category of pest those pests the interviewee considers to be a problem.

    2. Read each choice to the interviewee and accept whatever they indicate.

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2. Which of the following is the households most severe pest problem? Select only one.
   1. If in question 1 the interviewee indicates no problems with pests, do not ask this question, but do check the columns titled "none" under each major heading.
   2. If the interviewee indicated several problems in question 1, check the one he considers to be the most severe.
   3. Check only one from all categories listed.

3. What pesticide(s) has the household used on the following pests? (Write in name of pesticide for each pest treated.) Indicate approximate number of square feet treated.

   1. Write the name (brand and/or active ingredient) of those pesticides used for each pest indicated in question 1.
   2. If a pest is indicated in question 1 and no treatment has been used leave blank.
   3. Indicate number of square feet treated with each pesticide after the name.

4. What was the cost of applying each of the aforementioned pesticides?
   1. Indicate the response of the interviewee in each column under which a response was given in question 3.
   2. If interviewee responds "unknown" or "don't know" enter this.

5. To which of the following pests have you or any member of your household applied the most pesticide during the last year? (Select one and indicate number of applications).

   1. Indicate interviewee's response with an X and the number of applications given.
   2. Select only one from all categories listed.

6. Of those pest problems in your household treated with pesticide, which were successfully treated? (Check as many as appropriate.)

   1. If no problems were treated, check columns for none.

TRAINING SESSION

Team and Route Information

Each interview team will be given an interview folder including route maps and route itinerary. The itinerary is a list of the blocks to be sampled grouped by census tract and identified by a two letter code. The first letter is the tract code; the second is the block code. The blocks to be sampled are shown on the field map identified by their code letters. Each block is further identified on the route itinerary by the four streets which bound the block.

Upon arrival at the selected block, first determine the number of household units on the block. A possible way to determine this is to count the number of mailboxes. Don't forget to count each apartment within an apartment building as a housing unit.

After determining the number of households on the block:

1. Park the car at any convenient space on the block.
2. The housing unit nearest to the place at which the car is parked is considered to be housing unit #1.
3. Determine from the route itinerary the number of households to be sampled on the block.
4. Numbering the households on the block clockwise from housing unit #1, select the required number of household units by consulting the provided list of random numbers.
5. Interview the selected households, inserting the appropriate tract and block codes in the HOUSEHOLD CODE in the FORM I.D.
6. All "not-at-homes" will be treated as call backs; the interviewer should return after 5:00 PM to these homes to attempt an interview. If there is still no one home upon return after 5:00 PM, the interviewer should circle 5 in the Status section on the top of page 1 of the questionnaire and the interview should be dropped from the survey. No alternates are to be substituted for "not-at-homes".
7. All vacants should be substituted with alternates immediately and not treated as call backs.
8. If there is someone home, but they are not over 18 years of age, then ask when the parents or household head will be home and come back at that time. Therefore, this will be treated as a "not-at-home" and a call back will be performed.
9. If the person at the selected housing unit refuses to cooperate do not select an alternate, but fill out the Header Information as fully as possible circling #3 of the status line to indicate the household refused the interview.

TRAINING SESSION

EXAMPLE OF SELECTION OF HOUSEHOLDS WITHIN A BLOCK

Suppose the block has 20 households on it and we are required to select 6 households for interview. Number the households clockwise from 1 to 20, where household No. 1 is that household which is closest to where the car is parked. Using the Table of Random Permutations, select a starting point and moving along the row of numbers select 9 distinct numbers which are between 1 and 20. We start, for example, with the number which is in the fifth row and third column of the first page. The starting number is 07. Since 7 is between 1 and 20, we will interview the seventh household on the block. The next number is 98, which is too large so that we ignore it and take the next number which is 19. There are no other numbers in the fifth row which are between 1 and 20 so we go to the sixth row. From the sixth row we get the numbers 5, 17, 10, 12, 18, 6, and 14. Therefore, we will interview households 5, 7, 10, 12, 17, and 19 on this block. If one of these housing units is vacant #18 is chosen as an alternate for this unit. If a second vacancy should be selected, #6 is used and so on.

For another block we could either select another starting point or proceed from where we left off, using the number 57, which is in the fifth row and 16th column of the first page. It is important to note that we would not use the same random numbers for each block. This is, if the next block also had 20 households and we were required to interview 6 of these, we would not necessarily interview households 5, 7, 10, 12, 17, and 19 but would select 6 new random numbers between 1 and 20.

TRAINING SESSION

Approach at Household Door

"Hello, I'm (name) from the Pesticide Studies Center. We're conducting a survey on the household usage of pesticides. Pesticides are such chemicals as weed killers, no-pest strips, flea powders, or insecticides like Raid, that you may personally use in your house, yard, or garden or perhaps have a commercial pest control company apply. Your home was randomly selected to participate in this study. Would it be possible to use several minutes of your time to complete our confidential questionnaire."

Anticipated questions at this point: (if the interviewee doesn't permit the interviewer to proceed with the questionnaire)

Possible questions:

1. "What is this study used for?"

   The interviewer could reply, "The information collected in this study will help the Pesticide Center evaluate the use of these chemicals that can be quite toxic or poisonous."

2. "What sort of questions do you want to ask?"

   We would like to ask you several questions about the pesticides that you use, how you handle them, and how you dispose of them when you're finished. We would also like to ask a few questions about your household."

3. "I don't use any pesticides."

   If it has not already been made clear what chemicals are considered pesticides, the interviewer might go into more detail on what chemicals are considered pesticides or perhaps reiterate any that were stated earlier.

If the answer is still no and the interviewer has established that pesticides are not used in the yard and garden also, the interviewer should tell the person that he has already answered the first question of the questionnaire and has played an important part in helping the researchers (us) determine usage patterns. A negative answer is as important to us as knowing about the usage patterns of people who use many pesticides. Now, would it be possible to ask why not and the interviewer states the answers to the second question.

The question concerning commercial application should have been covered in the introductory questioning (as a negative reply).

The question about commercial application is asked or reiterated. For example, "You did state that you have never had a pest control company treat any of your premises and this would include any termite treatments?"

The question on pest strips might be handled, "And you also said you have never used pest strips?"

The question on pet insecticides could be asked in two parts by first asking if they have any pets and then asking if their pets wear flea collars or if flea shampoo or powder is used.

The question regarding disinfectants can be asked in the following manner, "Do you use any disinfectants such as Lysol or Pine-Sol for the control of molds or mildew?"

If all negative answers are obtained on page 1 and 2, then the interviewer should attempt to complete all of page 6. If the interviewee objects, tell him/her that it is just as important to obtain the household and poisoning data on non-users as it is with users.

Throughout the interview, be as congenial as possible. Be relaxed and smile, and you'll be amazed how easily the interview is completed.

General Hints:

1. There is no need to pursue any question that the interviewee doesn't want to answer (i.e., age, occupation, race).

2. Obviously, tact and tone of voice are two mannerisms that are important in any study that involves interviewing. However, it is extremely important to practice these characteristics during the sensitive questions about occupation and education.

   Sincerity is extremely important during the opening paragraph since many people are "sizing up" the interviewer and deciding on whether the interviewer can be trusted in the home for the interview. Many interviewees grant interviews primarily on the basis of how the interviewer presents himself and secondarily on how important his problem or questions are.

3. There might be occasions when the interviewer feels that the information that he is receiving is not true or reliable. A place for comments is located at the end of page 2 of the questionnaire where the interviewer can note such problems or other pertinent information.

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Addendum to Training Manual

Household Pesticide Usage Study

1. The most important change that has occurred in the survey is that of substitutions. On page 12 of the old training manual that was used in May at the training course at Colorado State University, it was stated that all not-at-homes will be treated as call-backs. If no one was home on the call-back, the old manual stated that alternate homes would be selected until a substitute interview was obtained. THIS IS NO LONGER THE CASE! The new manual now states on page 14, number 6, that if no one is home on the call-back, number 5 should be circled in the status section on page 1 of the questionnaire, and the interview should be dropped from the survey. No alternate households are to be substituted for "not-at-homes". However, substitutions using random numbers, will still be obtained for all vacant houses, and these can be done immediately upon encounter in the field. To counter balance the anticipated "not-at-homes" upon call-back and refusals, which we estimate will be about 20%, the total number of interviews to be attempted nationwide has been increased by 20% to a nationwide sample of 10,000 interviews.

2. The remainder of the changes involved the questionnaire and are as follows:
   A. Page 1 of the questionnaire:
      1. Number 4 in status on Ver. 4 of the questionnaire--"Alt. interview due to Not Home"—has been changed to–"Alt. interview

due to vacancy"— on Ver. 5.

2. Number 5 in STATUS on Ver. 4 of the questionnaire-"Alt. interview due to vacancy — has been changed to-"Interview not obtained on call-back".
3. The INSPECTION section now reads simply either Inspected or Not Inspected and a serious attempt should be made to inspect the pesticides and storage facilities of every household interviewed. Therefore, the 10% inspection figure as stated on page 2 of the old training manual is no longer applicable. Instructions for the inspection section are given on page 2 of the new training manual.
4. A definition of premises has been inserted, immediately following the pesticide definition. These two definitions are to be recited before beginning each interview.
5. Question 5 now is inclusive of moth crystals, flakes, aerosols.
6. An unknown column has been added to questions 1, 2, 3, and 5.

B. Page 2 of the questionnaire:

1. Question 6 has been slightly reworded, however, there is no change in context of the question.
2. Unknown columns have been added to questions 8 and 9.
3. Note: All changes on pages 1 and 2 of the questionnaire are accompanied by corresponding changes in the new training manual.

C. Pages 3 and 4 of the questionnaire:

1. The section headed by the question—"Where on the premises has this pesticide been used in the past 12 months?", has been changed to include two new columns entitled LAWN and FLOWER BED. YARD has been changed to YARD (other than lawn) and GARDEN has been changed to VEGETABLE GARDEN. Hopefully this will take care of any confusion that might have occurred in this section. Instructions explaining this section are found on page 7 of the training manual.
2. New sections have been added on pages 3 and 4.
    a. Do you or any member of the household read the pesticide label? __Yes __No
    b. Is the print on the label large enough to read? __Yes __No
    c. Is the label understandable by those who use the pesticide? __Yes __No
    d. Are all the labels on stored original containers still intact and legible? __Yes __No
3. These four new sections are explained on page 8 of the new manual and replace questions 11, 13, and 16 that were formerly on page 5 of the old questionnaire, and the old question 13 was subdivided into two parts. Thus the label information will be obtained for each pesticide used or stored.

D. Page 5 of the questionnaire:

1. The main change that has occurred on page 5 is that questions 11, 13, and 16 have been removed and put on pages 3 and 4 of the new questionnaire.
2. Question 12 on the old form is question 11 on the new and the

column Applications has been added. Applications means what type of pests that particular product is effective against.

3. Question 14 on the old form has been changed to question 12 on the new and its wording improved to stand alone.
4. Question 15 on the old form is now question 13 on the new form and Label has been added as a column.
5. Question 17 on the old form has been split into two questions and is now questions 14 and 15 on the new form. Question 14 concerns just undiluted pesticides, and question 15 concerns pesticides that the consumer has diluted for use and includes container rinses.
6. Question 19 on the old form has also been subdivided into two questions and is now questions 17 and 18 on the new form. Question 17 concerns just the container and question 18 concerns just the pesticide application equipment.

E. Page 6 of the questionnaire:

1. The poisoning section on the top of page 6 remains essentially the same, with the exception of the question numbers.
2. The primary changes that have occurred in the Household Data Section on page 6 are that age and education levels are to be obtained for both the Household Head and the person being interviewed, rather than just the "Household Head" as it was on the old form.
3. A new question, number 33 has also been added. It's purpose is to determine the rough size of the premises (less than

½ acre or greater than ½ acre). The interviewee is to be given the choices and determine the size, not the interviewer. If the person being interviewed doesn't know, then Unknown is to be marked.

4. The questions concerning education level, the number of years of school completed is to now be written in instead of a choice being circled.
5. On the question concerning type of residence and ownership, Public Housing has been moved from A to B, which will make the choices much clearer.
6. The columns have been reorganized in the question on ages of household members to facilitate marking by the field interviewer.
7. The last question on the page concerning race has been changed so that the interviewer will determine race of Household Head, instead of the interviewee. Most of the time this can be done without asking.

3. Please note that all of the changes on the questionnaire are included in the new manual, and it should be thoroughly read.

APPENDIX C

FREQUENCY OF ALL OBSERVED PESTICIDES LISTED ACCORDING TO THE PINDEX SYSTEM

Pindex Number	Frequency	Percent of Total	Pindex Number	Frequency	Percent of Total
0	175	1.2	8151.	1	.0
232.	7	.0	8193.	4	.0
843.	1	.0	8202.	2	.0
933.	1	.0	8210.	29	.2
1008.	1	.0	8227.	6	.0
1009.	1	.0	8240.	9	.1
1503.	1	.0	8243.	23	.2
2105.	1	.0	8268.	11	.1
2200.	1	.0	8276.	95	.7
2968.	1	.0	8284.	12	.1
2980.	63	.4	8340.	1	.0
3087.	2	.0	8344.	1	.0
4183.	1	.0	8400.	7	.0
4770.	6	.0	8466.	1	.0
4911.	1	.0	8540.	1756	12.5
5702.	1	.0	8545.	1	.0
5827.	1	.0	8551.	1	.0
5918.	1	.0	8554.	1	.0
6007.	1	.0	8557.	210	1.5
6712.	1	.0	8565.	40	.3
8076.	1	.0	8573.	43	.3
8110.	35	.2	8577.	1	.0
8128.	89	.6	8581.	136	1.0
8144.	402	2.9	9001.	34	.2

APPENDIX (Continued)

Pindex Number	Frequency	Percent of Total	Pindex Number	Frequency	Percent of Total
9019.	29	.2	9308.	3	.0
9027.	4	.0	9316.	12	.1
9035.	5	.0	9324.	2	.0
9043.	2	.0	9332.	5	.0
9050.	2	.0	9340.	8	.1
9068.	14	.1	9357.	1	.0
9076.	18	.1	9381.	2	.0
9084.	7	.0	9399.	4	.0
9092.	5	.0	9404.	1	.0
9100.	23	.2	9407.	14	.1
9126.	1	.0	9415.	4	.0
9134.	2	.0	9423.	2	.0
9175.	5	.0	9430.	1	.0
9183.	11	.1	9431.	4	.0
9191.	6	.0	9449.	5	.0
9209.	1	.0	9464.	8	.1
9217.	4	.0	9467.	1	.0
9225.	1	.0	9472.	2	.0
9233.	22	.2	9480.	2	.0
9241.	8	.1	9498.	5	.0
9255.	1	.0	9506.	2	.0
9258.	3	.0	9514.	2	.0
9266.	82	.6	9530.	4	.0
9274.	4	.0	9548.	3	.0
9282.	18	.1	9555.	3	.0
9290.	8	.1	9563.	4	.0

APPENDIX (Continued)

Pindex Number	Frequency	Percent of Total	Pindex Number	Frequency	Percent of Total
9571.	14	.1	9910.	2	.0
9589.	2	.0	9928.	1	.0
9597.	19	.1	9936.	1	.0
9605.	11	.1	9944.	2	.0
9613.	19	.1	9951.	2	.0
9639.	3	.0	9969.	2	.0
9647.	3	.0	9977.	9	.1
9662.	1	.0	9985.	2	.0
9670.	1	.0	9993.	7	.0
9688.	2	.0	10009.	1	.0
9704.	9	.1	10017.	4	.0
9712.	6	.0	10033.	4	.0
9738.	3	.0	10041.	2	.0
9746.	1	.0	10058.	4	.0
9753.	1	.0	10074.	7	.0
9761.	16	.1	10082.	3	.0
9779.	20	.1	10090.	1	.0
9803.	5	.0	10116.	1	.0
9811.	3	.0	10124.	1	.0
9837.	1	.0	10132.	1	.0
9845.	2	.0	10140.	2	.0
9860.	3	.0	10157.	1	.0
9878.	10	.1	10165.	1	.0
9886.	2	.0	10173.	10	.1
9894.	1	.0	10181.	3	.0
9902.	1	.0	10199.	14	.1

APPENDIX (Continued)

Pindex Number	Frequency	Percent of Total	Pindex Number	Frequency	Percent of Total
10207.	6	.0	10686.	1	.0
10215.	1	.0	10694.	6	.0
10223.	6	.0	10695.	1	.0
10231.	7	.0	10702.	18	.1
10249.	3	.0	10710.	1	.0
10256.	1	.0	10736.	2	.0
10272.	4	.0	10751.	8	.1
10306.	14	.1	10769.	1	.0
10322.	2	.0	10777.	1	.0
10330.	2	.0	10785.	1	.0
10363.	1	.0	10793.	6	.0
10371.	3	.0	10801.	1	.0
10397.	2	.0	10803.	1	.0
10439.	1	.0	10827.	6	.0
10462.	15	.1	10835.	3	.0
10464.	1	.0	10850.	3	.0
10496.	1	.0	10868.	2	.0
10504.	3	.0	10876.	1	.0
10512.	4	.0	10884.	1	.0
10538.	6	.0	10892.	2	.0
10561.	7	.0	10900.	1	.0
10603.	2	.0	10918.	2	.0
10629.	2	.0	10926.	1	.0
10645.	1	.0	10942.	3	.0
10652.	1	.0	10983.	1	.0
10660.	2	.0	11049.	1	.0

APPENDIX (Continued)

Pindex Number	Frequency	Percent of Total
11056.	3	.0
11064.	1	.0
11072.	1	.0
11098.	2	.0
11106.	1	.0
11122.	1	.0
11148.	1	.0
11155.	1	.0
11163.	4	.0
11197.	1	.0
11213.	1	.0
11221.	3	.0
11239.	1	.0
11262.	3	.0
11270.	2	.0
11296.	2	.0
11304.	1	.0
11361.	1	.0
11445.	1	.0
11452.	1	.0
11460.	1	.0
11486.	2	.0
11494.	1	.0
11502.	1	.0
11510.	1	.0
11528.	2	.0
11544.	2	.0
11551.	1	.0
11569.	1	.0
11585.	1	.0
11593.	1	.0
11601.	2	.0
11627.	1	.0
11635.	1	.0
11650.	1	.0
11668.	1	.0
11684.	1	.0
11692.	2	.0
11700.	1	.0
11718.	1	.0
11734.	7	.0
11742.	1	.0
11775.	1	.0
90001.	59	.4
100815.	1	.0
101281.	4	.0
101685.	2	.0
106153.	1	.0
106229.	2	.0
106815.	866	6.2
106851.	2	.0
108056.	1	.0

APPENDIX (Continued)

Pindex Number	Frequency	Percent of Total	Pindex Number	Frequency	Percent of Total
120020.	1	.0	300962.	9	.1
200071.	10	.1	300970.	25	.2
200170.	1	.0	300978.	1	.0
200275.	1	.0	301109.	12	.1
200340.	1	.0	301127.	2	.0
200343.	1	.0	301150.	7	.0
200345.	261	1.9	301168.	1	.0
200385.	1	.0	301172.	1	.0
200386.	49	.3	301182.	1	.0
200725.	674	4.8	301192.	95	.7
201178.	2	.0	301341.	1	.0
201293.	17	.1	301804.	2	.0
201295.	2	.0	301952.	56	.4
201319.	57	.4	302917.	8	.1
201327.	18	.1	302927.	4	.0
201731.	3	.0	302968.	187	1.3
202028.	18	.1	303131.	1	.0
202176.	138	1.0	303247.	1	.0
202490.	1	.0	303396.	1	.0
202499.	129	.9	303818.	19	.1
202598.	2	.0	304626.	38	.3
202952.	2	.0	304980.	4	.0
202978.	2	.0	308040.	1	.0
204990.	1	.0	308044.	1	.0
205955.	1	.0	308047.	3	.0
300673.	40	.3	308048.	1	.0

APPENDIX (Continued)

Pjndex Number	Frequency	Percent of Total	Pindex Number	Frequency	Percent of Total
308049.	489	3.5	402313.	382	2.7
308055.	3	.0	402317.	1	.0
308056.	29	.2	402420.	2	.0
308066.	1	.0	402719.	3	.0
308099.	1	.0	402784.	20	.1
308409.	1	.0	403014.	1	.0
308673.	1	.0	403247.	1	.0
309526.	10	.1	403733.	8	.1
400218.	34	.2	404016.	1	.0
400291.	3	.0	404863.	1	.0
400325.	20	.1	404897.	11	.1
400416.	1	.0	406652.	9	.1
400697.	5	.0	406815.	3	.0
401042.	1	.0	408049.	1	.0
401075.	1	.0	409623.	5	.0
401109.	449	3.2	409698.	3	.0
401280.	1	.0	410027.	2	.0
401281.	1207	8.6	411033.	6	.0
401331.	1	.0	501619.	2	.0
401372.	9	.1	502294.	1	.0
401406.	2	.0	504873.	1	.0
401554.	52	.4	504878.	1	.0
401695.	11	.1	508049.	39	.3
401828.	2	.0	510636.	5	.0
402073.	12	.1	600122.	9	.1
402181.	1	.0	600130.	6	.0

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APPENDIX (Continued)

Pindex Number	Frequency	Percent of Total	Pindex Number	Frequency	Percent of Total
600205.	2	.0	900456.	4	.0
600725.	1	.0	900639.	64	.5
601716.	13	.1	900647.	1	.0
602730.	3	.0	900693.	1	.0
602888.	22	.2	901109.	1	.0
603001.	1	.0	901265.	1	.0
603076.	1	.0	903492.	4	.0
603118.	31	.2	904524.	3	.0
603167.	1	.0	904797.	1	.0
603449.	1	.0	905059.	16	.1
605048.	24	.2	910265.	2	.0
701474.	2	.0	910414.	3	.0
800086.	45	.3	911404.	1	.0
800088.	1	.0	1004103.	1	.0
802736.	20	.1	1004183.	340	2.4
803241.	3	.0	1004185.	1	.0
803247.	787	5.6	1016815.	6	.0
803257.	1	.0	1106087.	1	.0
803274.	2	.0	2000000.	1	.0
803353.	131	.9	2000345.	1	.0
803427.	22	.2	2000479.	1	.0
803718.	41	.3	2000658.	2	.0
804690.	1	.0	2000685.	618	4.4
809152.	1	.0	2000933.	16	.1
809376.	1	.0	2001519.	3	.0
900142.	15	.1	2001642.	1	.0

APPENDIX (Continued)

Pindex Number	Frequency	Percent of Total	Pindex Number	Frequency	Percent of Total
2001790.	2	.0	2502407.	1	.0
2001865.	52	.4	2502409.	367	2.6
2002152.	339	2.4	2502509.	1	.0
2004190.	3	.0	2502524.	2	.0
2004497.	24	.2	2504314.	4	.0
2004927.	1	.0	2505923.	1	.0
2005593.	30	.2	2522409.	1	.0
2005595.	23	.2	3002391.	1	.0
2006245.	1	.0	3002540.	2	.0
2006582.	32	.2	3100195.	32	.2
2006685.	3	.0	3100559.	2	.0
2006852.	1	.0	3101383.	9	.1
2101574.	1	.0	3101540.	13	.1
2101921.	1	.0	3102480.	4	.0
2102333.	14	.1	3102795.	25	.2
2102457.	3	.0	3102910.	2	.0
2104230.	16	.1	3103407.	2	.0
2104330.	1	.0	3103470.	29	.2
2104600.	1	.0	3103488.	55	.4
2123201.	1	.0	3103553.	9	.1
2204634.	1	.0	3104783.	1	.0
2400315.	2	.0	3105061.	2	.0
2404036.	8	.1	3404803.	1	.0
2410579.	6	.0	3405867.	4	.0
2500981.	15	.1	3500824.	17	.1
2502049.	1	.0	3504941.	7	.0

APPENDIX (Continued)

Pindex Number	Frequency	Percent of Total	Pindex Number	Frequency	Percent of Total
3505153.	10	.1	6000696.	1	.0
3506466.	1	.0	6006172.	1	.0
3604212.	1	.0	6006693.	1	.0
4002093.	2	.0	6006696.	263	1.9
4105995.	1	.0	6006712.	274	2.0
4403754.	23	.2	6008593.	4	.0
4403762.	1	.0	6011423.	5	.0
4822110.	1	.0	6011753.	1	.0
5008073.	25	.2	6109656.	14	.1
5008099.	21	.1	6110746.	1	.0
5009725.	1	.0	6209795.	1	.0
5080273.	1	.0	6209829.	1	.0
5108139.	6	.0	6210355.	2	.0
5303151.	1	.0	6210447.	4	.0
5310677.	1	.0	6210967.	2	.0
5402201.	31	.2	6309165.	8	.1
5608062.	48	.3	6309785.	2	.0
5610677.	1	.0	6311377.	1	.0
5688062.	2	.0	6311385.	4	.0
5706668.	2	.0	9000268.	1	.0
5706700.	1	.0	9999999.	1	.0
5811476.	1	.0	TOTAL	14037	100.0

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